HOFFMAN HEATING EQUIPMENT

Hoffman Heating Equipment

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PART II

HOFFMAN SPECIALTY COMPANY, Inc.

Waterbury, Conn.

BRANCHES IN PRINCIPAL CITIES

Canadian Representative: Crane, Ltd., Montreal

Branches Throughout the Dominion

PART I

Hoffman Valves and Controlled Heat Equipment

Efficient Heating

To give maximum heat and comfort from fuel burnt is the fundamental requirement of the modern heating system. Fuel consumption beyond that necessary to maintain indoor heating comfort is waste.

By providing the correct handling of steam, air and water, Hoffman Valves insure the reduction of fuel waste, efficient performance of the heating system and the elimination of heating troubles.

Basic Principle

The basic principle used in the design of all Hoffman Venting Valves is that of an all-metal thermostatic member containing a volatile or heat sensitive fluid which causes valve action upon slight temperature changes.

Automatic

Hoffman Valves are automatic and non-adjustable, and thus insure flexibility and economy of operation without thought or attention on the part of the user.

Accuracy

As the internal fluid pressure in the thermostatic member maintains a constant relationship with the external steam pressure, Hoffman Valves operate with the same degree of accuracy throughout the wide range for which each valve is intended.

GUARANTEE

Every Hoffman Valve (except Nos. 20 and 21 Traps) is individually tested and guaranteed to function properly for a period of five years, when installed and operated under conditions for which they were designed. A written guarantee is gladly furnished upon request.

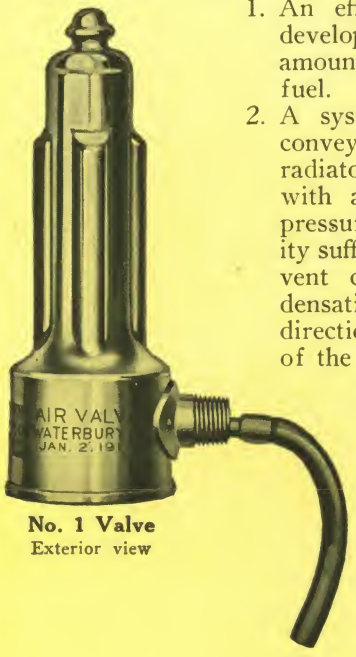
Continued on next page

HOFFMAN VENTING VALVES

One-Pipe Gravity Steam Systems

The satisfactory and economical operation of one-pipe steam systems is dependent upon:

1. An efficient boiler that develops the maximum amount of steam from fuel.
2. A system of piping to convey steam to the radiators or heating units with a nominal loss in pressure and at a velocity sufficiently low to prevent conflict with condensation flowing in a direction opposite to that of the steam.
3. Air valves on heating units and pipe lines to eliminate air from the system at a rate consistent with best results and to close the vent port when valve is in contact with steam or water.



No. 1 Valve
Exterior view

Perfect results can be obtained only when these three requirements are met. A combination of the first two cannot completely overcome a deficiency in the third. An efficient boiler with a well-designed system of piping cannot result in a satisfactory heating plant unless air is properly relieved from the system. Money well invested in a reliable boiler and piping becomes a "frozen asset" through false economy in using low priced inefficient air valves.

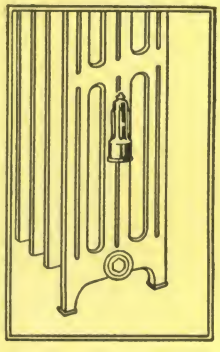
Hoffman No. 1 Valve

The No. 1 Hoffman Siphon Air Valve insures positive, noiseless and trouble-proof venting of radiators. It also goes a step farther in improving the action of the boiler and piping system or overcoming to a large extent any deficiencies that may exist in them.

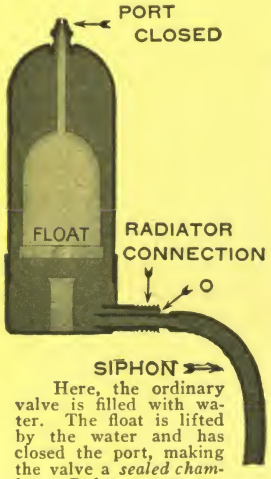
The diameter of the vent port in the No. 1 Hoffman Valve has been scientifically determined to free the radiator of air at a rate which does not cause excessive initial condensation during the heating-up period. Such action prevents the gurgling or pounding which is caused by too rapid release of air.

The rate of air flow *from* the radiator governs the rate of steam flow *into* the radiator. The rate of air venting is, therefore, an important factor in radiator performance. In addition, if air is released at too high a velocity, water piles up in the far end of the radiator causing valve action. This slows the rate of venting and, with improper valve action, "spitting" occurs.

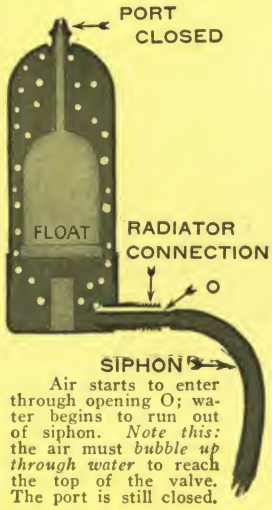
Thermostatically, the action of the Hoffman Valve is so sensitive that it positively distinguishes between steam and heated air. Upon contact with steam the valve instantly closes and when air at a temperature a few degrees less than that of the steam reaches the valve it is promptly released. This action is very important, for approximately one-third of a cubic inch of air or non-condensible gas is released by the condensation of steam



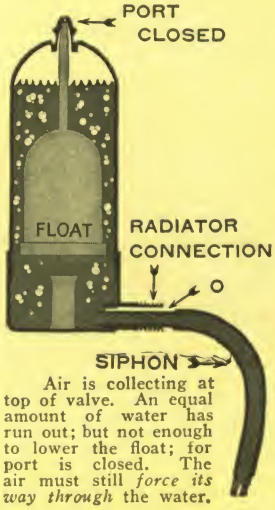
The Operation of the Ordinary Valve



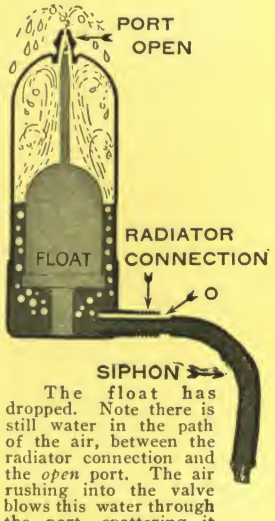
Here, the ordinary valve is filled with water. The float is lifted by the water and has closed the port, making the valve a *sealed chamber*. Before water can run out, air must enter to take its place.



Air starts to enter through opening O; water begins to run out of siphon. *Note this:* the air must *bubble up through water* to reach the top of the valve. The port is still closed.



Air is collecting at top of valve. An equal amount of water has run out; but not enough to lower the float; for port is closed. The air must still *force its way through* the water.



The float has dropped. Note there is still water in the path of the air, between the radiator connection and the *open* port. The air rushing into the valve blows this water through the port, spattering it over floors and walls.

Continued on next page

HOFFMAN VENTING VALVES

per square foot per hour, and unless provision is made for venting this air from the radiator, full efficiency is not obtainable.

The thermostatic member is a light buoyant float which closes the port without leakage whenever water surges into the valve. As soon as water is siphoned from the valve the port is opened and venting is resumed without the slightest "spit." This action is made possible by the double shell construction which makes the Hoffman Valve the only one on the market having perfect siphonic action.

The difference between the action of ordinary air valves and the Hoffman Valve under water conditions is shown by the diagrams at the bottom of pages 2 and 3.

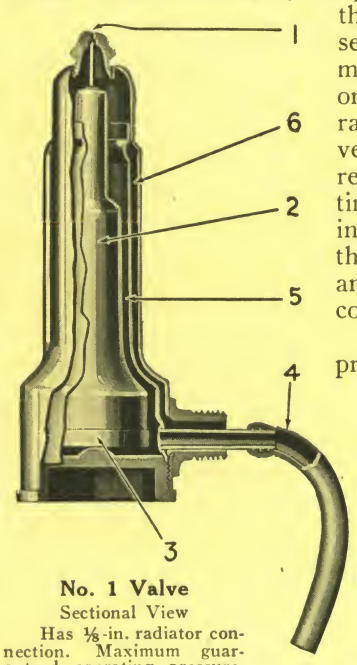
Operation of No. 1 Hoffman Valve

As soon as steam is generated at the boiler, a pressure is exerted on air in the radiators and as the vent port (1) is open, air will escape at the proper rate to cause steam to flow into the radiator and condensation to return through the same pipe line without commotion of any sort.

As steam advances in the radiator the air becomes warmer, but this temperature increase has no effect on the fluid sealed up within the float (2) until a temperature of 180° F. is reached. At this point the thermostatic fluid starts to vaporize. As the fluid is sealed up in the float under a vacuum, the vaporization continues until a temperature of 195° is reached, when the fluid pressure becomes equivalent to atmospheric pressure. With further increase in temperature the fluid pressure increases until, at a temperature of 207-208°, a sufficient pressure is generated to overcome the metal tension of diaphragm (3). Then the vent port instantly closes.

It will thus be seen that the vent port is either wide open or closed tightly. The instantaneous action in changing from a wide open to a closed port results in practically noiseless venting. In valves where the port is slowly closed a noticeable hissing occurs as the air escapes through the narrow aperture. In addition, the port is frequently prematurely closed and air bottled up in the radiator.

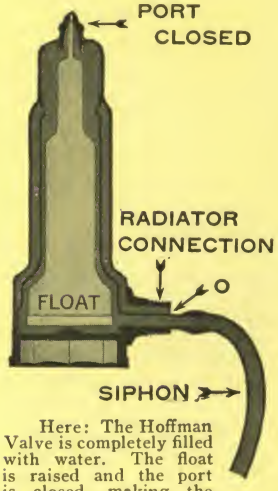
Whenever air at a temperature of one or two degrees less than the temperature of the steam reaches the valve, the port is opened and the air vented. Observation of a Hoffman Valve installed on a steam hot radiator will show venting of air at regular intervals, the time between venting depending upon the size of radiator and rate of steam condensation.



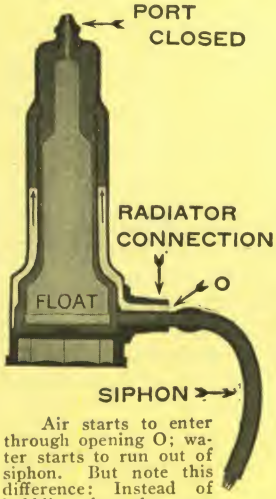
No. 1 Valve
Sectional View
Has ⅛-in. radiator connection. Maximum guaranteed operating pressure, 10 lbs.

If, through improper pitch of the piping, or radiator, water is present in excessive quantities, its escape through the vent port is prevented by the prompt operation of the thermostatic member which is likewise a buoyant float. As soon as water drops away from the valve the

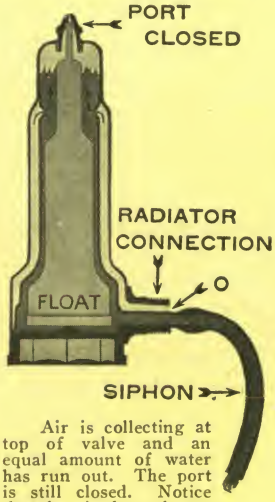
The Operation of the Hoffman Valve



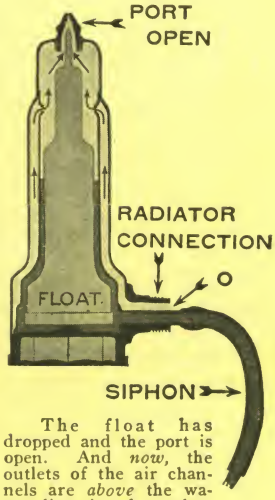
Here: The Hoffman Valve is completely filled with water. The float is raised and the port is closed, making the valve a *sealed chamber*, which air must enter before the water can run out.



Air starts to enter through opening O; water starts to run out of siphon. But note this difference: Instead of bubbling through water, the air is *compelled* to move through *special air channels* to reach the top of the valve.



Air is collecting at top of valve and an equal amount of water has run out. The port is still closed. Notice that the air-channels are now *clear of water*.



The float has dropped and the port is open. And *now*, the outlets of the air channels are *above* the water line in the valve. There is not a *drop* of water in the path of the air. Therefore valve *cannot* spit or leak.

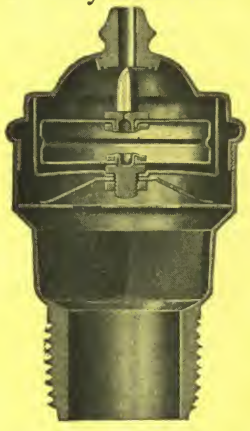
Continued on next page

HOFFMAN VENTING VALVES

siphon (4) drains the float chamber (5) and the vent port is opened, air passing through the valve in the space (6) between the inner and outer shell. The flow of air through this space occurs at the same time that the water lowers in the float chamber. As a result, the opening of the vent port occurs without the escape of water. Because of this construction providing separate passages, release of air from the valve and the drainage of water back into the radiator takes place without conflict.

Venting the Pipe Lines

If only radiators in a one-pipe system are vented, distribution of steam is not uniform. The radiators near the boiler will heat first and those at the end of the pipe lines will be the last to fill with steam. If, however, the end of the main is vented, steam will quickly fill the piping and upon closing the main vent will then flow into the radiators at a uniform rate. This permits the radiators located at distant points from the boiler to receive their supply of steam practically as quickly as the radiators close to boiler.

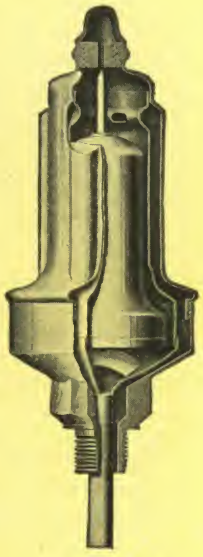


No. 4 Valve

Standard connection, ¾ in. Supplied with ¼-in. connection when so ordered. Maximum guaranteed operating pressure, 10 lbs.

The valve is intended for service where steam and air only are to be handled. It should not be installed under conditions where water is present in excessive quantities, for the valve does not contain combination float and thermostatic member similar to the No. 1 Valve. It, therefore, should not be used for venting the end of return mains where the distance between the low point in the main and the boiler water line is less than 18 inches.

Thermostatically, the No. 4 Valve operates in the same manner as the No. 1 Valve in that it closes tightly upon steam contact and opens when air at a temperature of two or three degrees less than steam is delivered at valve.



No. 5 Valve

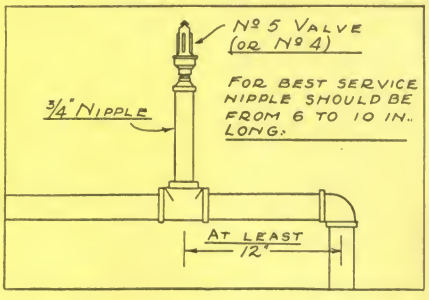
Maximum guaranteed operating pressure for valves with $\frac{1}{16}$-in. port, 10 lbs.; for $\frac{3}{16}$-in. port, 3 lbs. Supplied with $\frac{3}{8}$-in. pipe connection. For less than 3 lbs. pressure $\frac{3}{16}$-in. port should be specified—from 3 lbs. to 10 lbs., $\frac{1}{8}$ in.

Hoffman No. 5 Valve

The No. 5 Hoffman Quick Vent Float Air Valve is intended for service similar to that of the No. 4, but in addition it may be used under conditions where water is encountered. Under water conditions the valve operation is the same as the No. 1 Valve, the double shell construction and siphon performing the same functions.

Hoffman No. 4 Quick Vent Valve

The No. 4 Hoffman Quick Vent Valve provides correct venting of the ends of mains and long risers. It is a large capacity valve with ⅛-inch port and is also recommended for other conditions where quick venting is required.



Use of No. 1 Hoffman Valves on Two-Pipe Gravity Systems

Hoffman No. 1 Valves are also suitable for use on two-pipe gravity systems.

Venting Valve Specification for One-Pipe Gravity Systems

The purpose and intent of this specification is to cover venting valves for a complete one-pipe gravity steam system.

While the system is being operated for temporary heat, or while it is being cleaned, radiators shall be equipped with pet cocks, or second-hand air valves.

After the system has been thoroughly cleaned, a No. 1 Hoffman Siphon Air Valve shall be installed on each radiator, and a No. 4 ¾-inch Hoffman Quick Vent inserted in a nipple and coupling, approximately 12 inches from the end of each main. The distance between the low point of the main and waterline of boiler shall not be less than 18 inches. (Where waterline difference is less than 18 inches a No. 5 Hoffman Valve with $\frac{1}{16}$-inch port shall be used.)

Optional—To prevent theft in Public Buildings, Apartment Building Entrances, etc.

Each No. 1 Valve shall be securely fastened to the radiator by means of a Hoffman Valve Lock. No tapping in the radiator for this purpose will be permitted.

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HOFFMAN VENTING VALVES

One-Pipe Gravity Vacuum Systems

The purpose of vacuum heating is to create and maintain a partial vacuum in the radiators and mains in order that steam may be generated at a temperature below 212 degrees.

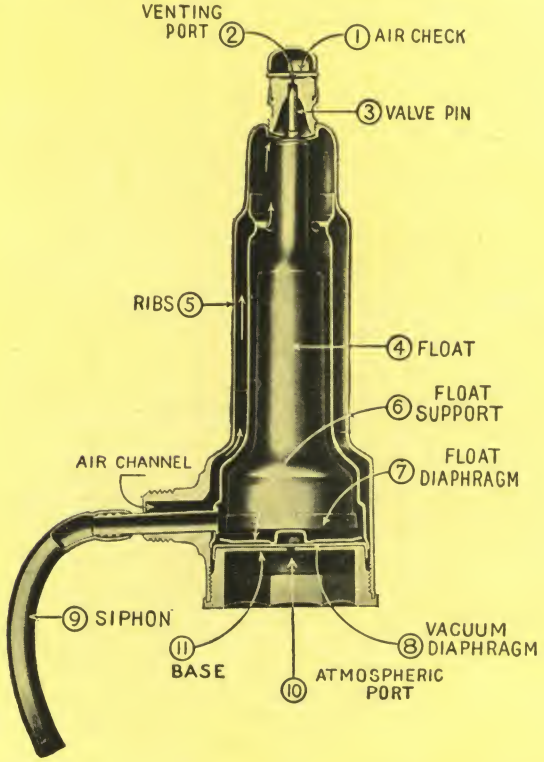
The advantages of a vacuum system over an ordinary steam system are that the radiators will retain their heat much longer—it is possible to get up steam more quickly—and a considerable saving in fuel consumption is effected.

Hoffman No. 2 Valves and Vacuum Specialties

Specialties for converting an ordinary one-pipe steam system into a vacuum system were first perfected by Hoffman Specialty Company and consist of Hoffman No. 2 Radiator Valves, Hoffman No. 6 or 16 Valves for venting mains, and Hoffman Kompo Gage.

Hoffman No. 2 Valves vent the air from the system in the same way that the No. 1 Valve does—promptly, efficiently and noiselessly. In addition, they perform another function. After air is exhausted from the radiators, the valve port automatically locks itself and prevents air from re-entering the radiator.

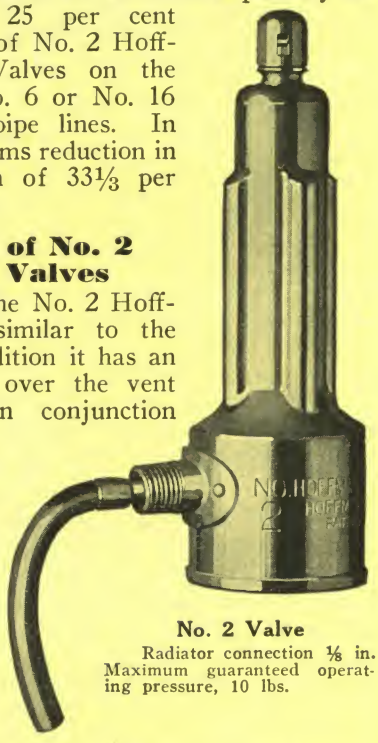
Under these conditions and provided the system is air-tight at all other points, when steam condenses in the radiator and shrinks to approximately 1/1700 of its previous volume, a vacuum is created. Air does not rush back into the system, and cool it off, nor is it necessary to force air out when steam is again generated.



The practical advantages of a vacuum system with Hoffman No. 2 Valves are shown by the chart of comparative performances on page 6.

Hoffman No. 2 Valves make possible the distribution of steam to all the radiators in 15 minutes instead of an hour as with an ordinary steam system and insure radiators remaining hot for three hours instead of 30 minutes after fires are banked.

In systems using oil or gas burners, the number of operations of the burner per day is reduced about 25 per cent through the use of No. 2 Hoffman Vacuum Valves on the radiators and No. 6 or No. 16 Valves on the pipe lines. In coal burning systems reduction in fuel consumption of 33⅓ per cent is common.



No. 2 Valve
Radiator connection ⅛ in. Maximum guaranteed operating pressure, 10 lbs.

Operation of No. 2 Hoffman Valves

In construction the No. 2 Hoffman Valve is similar to the No. 1 but in addition it has an air check valve over the vent port working in conjunction with a vacuum diaphragm.

Normally the air check (1) does not function in the maintenance of a vacuum, for when a radiator is filled with steam and the float diaphragm (7) is expanded, closing the port, the vacuum diaphragm (8) will expand whenever the pressure goes down below atmosphere and follow up the contracting float diaphragm, thus maintaining the port closed against air intake.

In a half-hot radiator the float diaphragm (7) is not expanded and the vent port (2) is open. Consequently with a cessation of steam generation, air would be drawn in to fill the space given up by the steam as it condenses were it not for the fact that as soon as the pressure goes down to atmosphere the air check drops and temporarily closes the vent port. Return of air is prevented and as soon as a vacuum of 1 inch is present in the system, vacuum diaphragm (8) expands, lifting the float, and closing the vent port. After this action occurs the air check has no further function.

The superiority of the diaphragm controlled port compared with valves having air check only is indicated by the fact that the total pressure exerted in holding the vent port closed is approxi-

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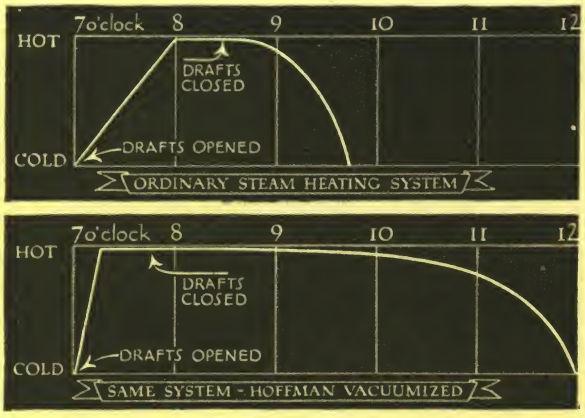
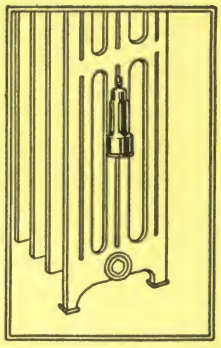
HOFFMAN VENTING VALVES



mately 20 times greater than that exerted in maintaining a check valve closed. This greater pressure exerted by the diaphragm holds the valve pin more tightly against its seat and also aids in crushing or pushing away small particles of dirt which might be caught between the valve pin and its seat, thus insuring a valve which is maintained tightly closed under normal as well as abnormal conditions.



How to Vacuumize a One-Pipe Steam System

To make an air-tight joint, white lead or some other joint compound should be used, but before applying, insert valve in tapping, giving it two or three turns, then apply the white lead to the thread. This will prevent lead from entering the valve through the inlet connection.

Valves

We recommend the use of packless or leak-proof radiator valves, but successful results can be obtained with ordinary radiator valves providing they are properly packed. If new valves of the standard type are installed they should be repacked in order to make certain that all possible air leaks through the stem stuffing box are eliminated. The same applies to old valves. For this purpose we recommend the use of $\frac{1}{16}$-inch Valve Stem packing of standard make. Customer should be informed that it is necessary to tighten up the stuffing nuts each year.

Air Leaks

The usual places for air leaks aside from stuffing boxes of the radiator valves are the water gauge, damper regulator diaphragm, gauge or try-cocks and safety valves. It is advisable to remove the old gauge glass washers and replace them with new washers. See that damper regulator does not permit escape of steam or allow air to be drawn into system. Discs and seats of the water column gauge cocks should be examined to make certain that they make an air-tight joint when closed. The try-cock on the water gauge should be tightened so that the handle can be turned only with considerable effort. Bubbles rising through the water in the gauge glass show a leak in the lower packing nut or try-cock.

For new work, the piping should be carefully installed so as to prevent as far as possible leakage of air at the joints. Before installing, fittings should be examined for sandholes. All pipe lines should be painted with black asphaltum.

Test

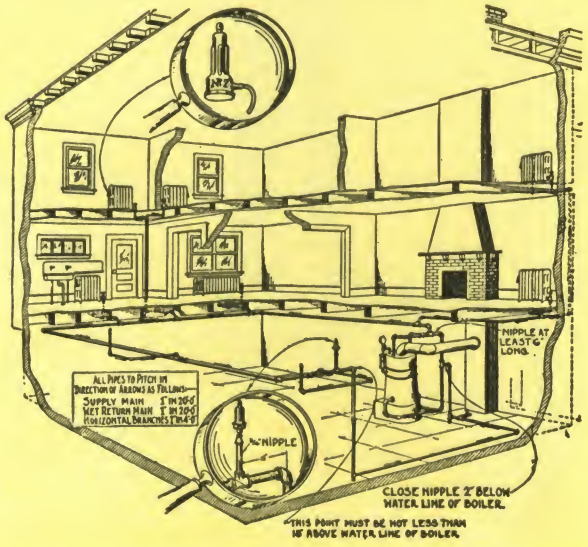
With boiler filled to proper level and before pipe covering is put on, a kindling fire should be started and a pressure of approximately ten pounds generated, maintaining this pressure until all radiators are steam hot from end to end.

Carefully examine joints for steam leaks. When it is ascertained that there are no leaks under steam pressure, dump the fire and open all windows in order to quickly create a vacuum.

If all joints are practically tight, the vacuum gauge should show at least 18 inches when the system is cold and should hold this vacuum with a loss of not over one inch every two hours. When the system is under highest vacuum, a second examination of all joints should be made and any air leaks will be denoted by a hissing at the point of leakage.

Installation of New Work

To obtain best results, valves should not be installed on new jobs until the system has been operated for several weeks using pet-cocks or old valves. The purpose of this preliminary operation is to clean out the radiators and pipes of the usual collection of dirt and other foreign substances which are always present in new work.



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HOFFMAN VENTING VALVES

Hoffman No. 16 and No. 6 Valves

While Hoffman No. 2 Valves create a vacuum in the radiators, it is also necessary in order to completely vacuumize the system to vent and lock the air out of the mains. The No. 16 Hoffman Valve is recommended for this purpose except in cases where the presence of excessive amounts of water is encountered, when the No. 6 Valve should be used.

No. 16 Valve

Is 3⅜ in. high over all and can be installed where the pipe lines are run too close to ceiling to accommodate the No. 6. Operation similar to No. 6 valve. Can be used on steam pressure up to 10 lbs. Size of port ⅛ in.; connection ¾ in.

The No. 16 and No. 6 Valves are suitable for use on mains, risers and other conditions where a quick vent is required and return of air to the system must be prevented.

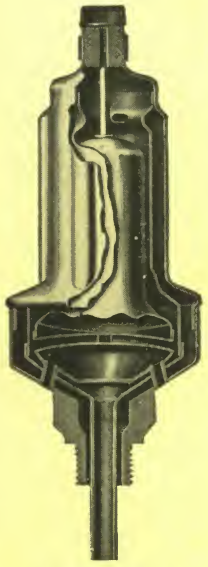
For venting the ends of mains where the difference between the low point of the main and the water line is less than 18 inches, the No. 6 Valve should always be used.

For handling all conditions in one-pipe vacuum systems, the No. 6 Hoffman valve is suggested. This valve has the double shell construction and operates under steam, air and water conditions in the same manner as the No. 2 Vacuum Valve.

Hoffman Valve Lock

The Hoffman Valve Lock prevents the unauthorized removal or theft of No. 1 and No. 2 Valves in public buildings, apartment houses, etc. In office and apartment buildings equipped with No. 2 Vacuum Valves, the Lock prevents removal of the valve when system is operating under vacuum and the resultant intake of air.

The Lock fits all types of radiators and requires no extra labor for tapping. The threaded connection of the air valve is slipped through the opening in the lock and then inserted in the radiator. When valve is in proper position two set screws are tightened with a special key. The "double bite" of the set screws on the curved surface of the radiator prevents turning the valve and they cannot be loosened without using the special wrench.



No. 6 Valve

Maximum guaranteed operating pressure for valves with ⅛-in. port, 10 lbs.; for ⅛-in. port, 3 lbs. Supplied with ⅜-in. pipe connection.

Kompo Gage

In order that the user may see the conditions under which the system is operating, a Kompo Gage should be installed on the boiler. For description, see page 13.

Valve Lock

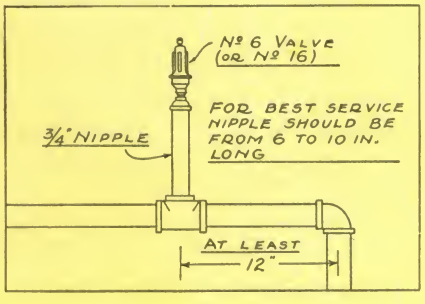
Suggested Specification for One-Pipe Gravity Vacuum System with Hoffman Specialties

The purpose and intent of this specification is to cover venting valves for a complete one-pipe vacuum system.

While system is being operated for temporary heat or cleaned, radiators shall be equipped with pet-cocks or second-hand air valves.

After the system has been thoroughly cleaned, a No. 2 Hoffman Vacuum Valve shall be installed on each radiator and a No. 16 Hoffman Vacuum Valve, inserted in a nipple and coupling, approximately 12 inches from the end of each main. The distance between the low point of the main and waterline of boiler shall not be less than 18 inches. (If waterline difference is less than 18 inches, specify No. 6 valve in place of No. 16.)

A Hoffman Kompo Gage shall be placed on the boiler.



Tests

After installing No. 2 and No. 16 valves and before pipe covering is attached, a test shall be made in the presence of architect's representative and be conducted as follows:

Boiler shall be filled to proper level and slow kindling fire started. When all radiators have been filled with steam, during which time boiler shall show a steady waterline, fire headway shall be increased and a pressure of 10 pounds generated. While maintaining this pressure, contractor will examine all joints for steam leakage and, upon finding system tight, fire is to be dumped and system permitted to go into vacuum as quickly as possible. When system is cool, a vacuum of not less than 18 inches shall be indicated and the rate of loss shall not be over a total of 2 inches in the following three hour period.

Optional—For Public Buildings, Apartment Houses, etc. "Each No. 2 Valve shall be securely fastened to the radiator by means of a Hoffman Valve Lock. No tapping in the radiator for this purpose will be permitted."

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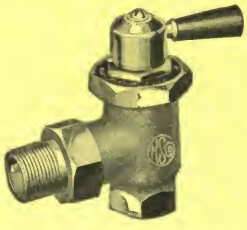
Hoffman Controlled Heat

Adaptable to All Types of Buildings

Hoffman Controlled Heat Consists of These Controlling Devices



No. 7 Valve

Controls—at the touch of a finger—the heat output of each radiator.

Differential Loop

Controls—automatically—and protects the boiler water line.

No. 8 Return Line Valve

Controls—automatically—the flow of condensation and air from each radiator.

Kompo Gage

Registers pressure or vacuum under which the system operates.

Damper Regulator

Controls—automatically—the combustion of fuel and the production of steam in accordance with the demand.

Continued on next page

Hoffman Controlled Heat

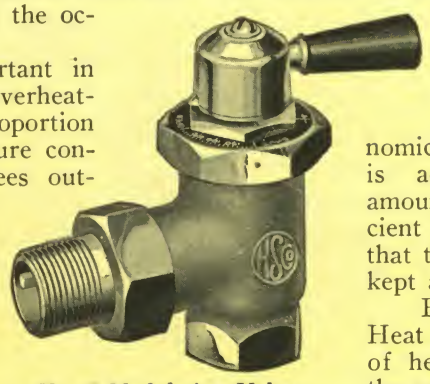
The ideal heating system is one in which heat is instantly available when required and where the heat output of each radiator can be controlled to meet the individual needs of the occupant of each room.

This requirement is important in preventing fuel waste due to overheating, as it is customary to proportion radiation for extreme temperature conditions (0 or minus 10 degrees outside, 70 degrees inside) notwithstanding the fact that in most localities minimum temperatures are reached on but ten or twelve days during the winter.

Therefore, during most of the heating season only 55 to 70 per cent of the total radiation is required to maintain 70 degrees inside.

In addition, the modern heating system should be economical to operate, require minimum attention and give trouble-proof service over a long period of time.

Hoffman Controlled Heat fulfills every requirement of the ideal heating system. It gives quick and uniform heating throughout the entire house or building—or it may be adjusted so as to provide rapid heating and high temperatures for certain rooms and lower temperatures for others.



No. 7 Modulating Valve

Regularly supplied with lever handle. On special orders, it can be furnished with wood wheels, lock shields or closed top. Also obtainable with extension stem and handle or chain pull.

It requires very little attention, being the most nearly automatic system of its type on the market. It is economical, because fuel consumption is accurately regulated by the amount of heat needed. And so efficient is Hoffman Controlled Heat that the amount of radiation can be kept at a minimum.

Finally, Hoffman Controlled Heat makes possible the regulation of heat output from a radiator in the same way that the flow of water from a faucet is controlled. By a touch of the finger, the valve lever may be set to turn the steam fully on, completely off or at any intermediate point desired. No other heating system offers the flexibility of Hoffman Controlled Heat.

Hoffman Controlled Heat is equally suitable for residences, apartment houses, schools, hotels, hospitals, office buildings or other structures.

How the No. 7 Valve Is Adjusted by the Heating Contractor

200 sq. ft. 150 sq. ft. 100 sq. ft. 50 sq. ft.

Dial Settings and Corresponding Port Areas

One of the outstanding advantages of Hoffman Controlled Heat is that the heating contractor can secure a perfect "balancing up" of the system. This is accomplished by the adjustment of a dial on the top of the valve which in turn regulates a port built into the valve.

The dial has a range of adjustments from 10 to 200 square feet of direct cast iron radiation, each graduation representing 10 feet with 2 ounces pressure at the radiator. When set at 200 feet the valve port is wide open and for smaller radiators it is cut down to the proper area for each individual radiator.

When the system is installed the dial is ordinarily set to correspond with the size of the radiator. Thus for an 80 foot radiator it is set at 80, for a 50 foot radiator at 50, etc. This setting is made by loosening the lock nut on top of the valve which permits turning the dial to the proper position.

With this done the system is ready to be balanced. The valve lever (which makes a secondary adjustment described on page 10) is set at the ½ mark. Steam is raised to the maximum pressure under which the system is intended to operate. Each radiator is inspected. Those one-half hot are O.K.

But some may be more than one-half hot due to oversizing the piping while others are less than half hot due to unreamed pipes or similar conditions. With other valves it would be necessary to let the radiators cool and take the valves apart to correct the adjustment.

Not so with the Hoffman No. 7. As the adjustment is *external* and *visible,* the valve may be set in a few moments *while the system is in operation.*

It is done in this way. If the radiator is less than half hot, the lock nut is loosened and the dial is set up a few graduations higher. On radiators that are more than half hot the dial is turned down a number of graduations. The lock nuts are then tightened to make the adjustment permanently correct.

The system is now "balanced up" and heat will be uniformly distributed to all parts of the system. But if it is desired to make some radiators heat first, it can be done by giving them a larger port opening than would be normally required. This valve is *truly modulating.* The port area may be varied with extreme accuracy, which means that an absolutely accurate control of steam admitted to the radiator is always readily obtained.

Continued on next page

HOFFMAN CONTROLLED HEAT

Operating Principle of Controlled Heat

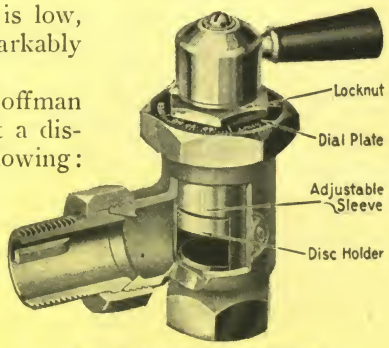
Hoffman Controlled Heat is a simple two-pipe vapor vacuum system. Because steam is generated at low pressure and a partial vacuum created in the system, fuel consumption is low, and the heating up period is remarkably short.

The specialties comprising Hoffman Controlled Heat and that make it a distinctly superior system are the following:

No. 7 Adjustable Modulating Valve

The most important feature of Hoffman Controlled Heat is the No. 7 Adjustable Modulating Valve. This valve is made in one size only (¾ in.) and is adaptable for radiators up to 200 square feet of heating surface. An externally adjustable port permits the heating contractor to proportion the port area of each valve to meet the requirements of the radiator. The accuracy of the adjustment is controlled by means of a graduated dial plate and the adjustment can be made whether steam is present in the system or not.

The adjustment is very simple. By loosening a lock nut and turning the valve handle an adjustable sleeve varies the port diameter in accordance with the position of the dial plate, after which the lock nut is tightened and graduated control of the adjusted port is obtained through the use of a secondary set of graduations, which permit the entrance of sufficient steam to heat one-quarter, one-half, three-quarters or the entire radiator.



No. 7 Modulating Valve
Sectional View

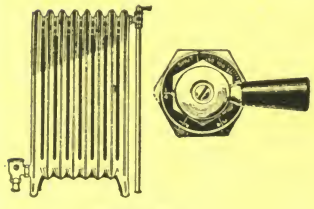
By means of this adjustable port the distribution of steam throughout the entire system can be so balanced that all radiators will heat uniformly, or if desired certain radiators can be favored and permitted to receive their supply of steam before the other radiators are completely heated.

In systems where oil or gas is used and the burner thermostatically controlled, the No. 7 Valve permits the proper distribution of steam and prevents the thermostat from closing down the burner before all radiators are uniformly heated.

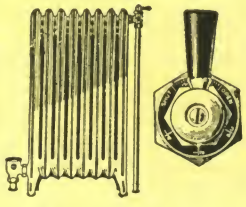
The valve is ruggedly constructed, having a cast body of steam metal heavily nickel-plated. Bonnet and tail piece are hot brass forgings, which have a tensile strength considerably greater than castings of the same composition.

The action of the valve is very free; a touch of the finger being sufficient to change the position of the lever handle. The stem stuffing box is packed with a special laminated packing which lasts indefinitely without requiring attention or tightening of the stuffing nut. This feature practically places the valve in the so-called "packless class."

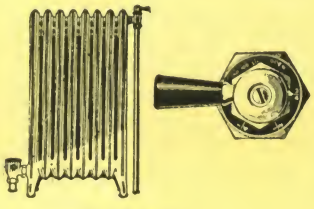
How the User Can Regulate Hoffman Controlled Heat



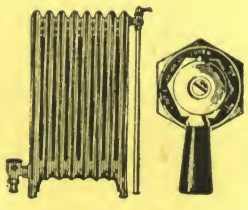
Mild Days
Open the valve so that the pointer is at the ¼ mark. Then there will be just enough heat in the radiator to take the chill off the room.



Average Days
If the valve is opened to the ½ mark, the radiator will give plenty of heat for the ordinary winter day.



Cold Days
On a really cold day more heat will be needed. Turn the valve to the ¾ mark.

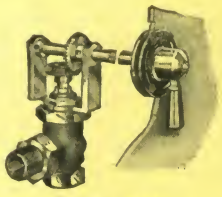


Bitter Cold Days
On raw, biting cold days when the thermometer hangs around zero, open the valve all the way.

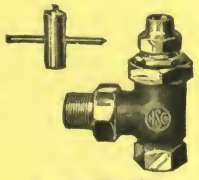
Wood Wheel

Chain Pull

Extension Stem



Bevel Gear



Lock Shield

Straight Extension Stems in any length can be furnished on receipt of measurements.

Continued on next page

HOFFMAN CONTROLLED HEAT

Nos. 8 and 9 Return Line Valves

On the return side of each radiator is a No. 8 Hoffman Return Line Valve for controlling the release of air and condensation from the radiator without steam loss. This valve is extremely sensitive in operation and maintains the return end of the radiator at practically the same temperature as the inlet, insuring full heat output.

Nos. 8 and 9 Return Line Valve or Radiator Trap

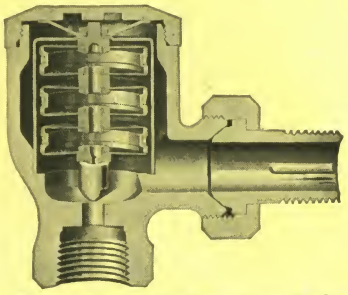
The body of the valve is steam metal, heavily nickelplated with cap and tail piece made of a hot brass forging.

The thermostatic member consists of six diaphragms assembled into a hollow chamber which contains the thermostatic fluid. Leakage at the joints is prevented by the special metal to metal construction, which is soldered at all points as an extra factor of safety. The method of making the joints, however, is such that the use of solder is not absolutely necessary.

In the thermostatic member of any valve it is essential that the metal used be such that it will not soften or crack under repeated operation. After several years of research the Hoffman Diaphragm Metal was developed which meets the most rigid requirements. Before being used the diaphragm metal must undergo durability tests which call for a minimum of three million operations expanding under pressure and contracting by metal tension at the rate of 70 times per minute in a temperature of 350 degrees. After passing this intensified test, which is more severe than would be encountered in ten years of service, the metal is put into manufacturing process.

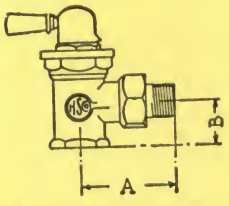
Another important feature in valve operation is the thermostatic fluid. In Hoffman Return Line Valves the fluid is of such a nature that its pressure maintains a constant relationship with that of steam and as a result the valves may be used within a wide pressure range and with uniformly sensitive operation under varying pressures. Because of the fluid and diaphragm metal used, Hoffman Return Line Valves may be used under pressures as high as 50 pounds without change or adjustment.

The thermostat is mounted in a cage so constructed that all thermostats for each size of valve may be interchanged without adjustment. This feature is very important in meeting specifications which call for the operation of a system during the cleaning out period with thermostat removed from the valve body. In replacing the thermostat it is simply necessary to insert it in the valve body, tighten the cap and perfect operation is obtained. This feature is also of great assistance in cleaning valves after they have been in service for long periods under unfavorable conditions.

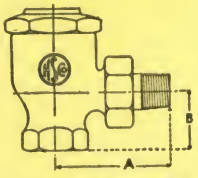


Nos. 8 and 9 Return Line Valve

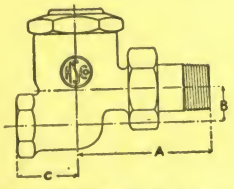
The No. 8 Valve is made in ½ in. size and can be supplied in angle, straightway, right and left hand offset patterns. The normal capacity is 200 sq. ft. of direct cast iron radiation; port diameter all pressures up to 50 lb., ¼ in. The No. 9 Valve is made in ¾ in. size, angle and straightway patterns only, having a normal capacity of 600 sq. ft. of direct cast iron radiation. For pressures under 15 lbs. valve is supplied with ⅜-in. port and $\frac{3}{16}$-in. port for pressures of 15 to 50 lbs.



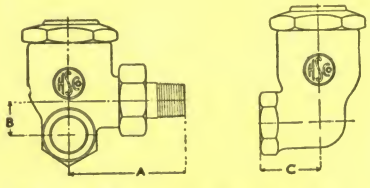
Nos. 7 and 19 Angle Pattern



Nos. 8, 9 and 18—Angle Pattern



Nos. 8, 9 and 18—Straightway Pattern



Nos. 8 and 18—Right or Left, Offset Pattern

Style	Size, in.	Diameter valve port, in.	Maximum capacity, sq. ft.	Dimensions†		
				A	B	C
No. 7 Angle	¾		200	2 7/8	1 3/8	
No. 19 Angle	¾		200	2 7/8	1 3/8	
No. 8 Angle	½	¼	200	2 21/32	1 9/32	
No. 8 Straightway	½	¼	200	2 21/32	25/32	1 13/32
No. 8 Offset	½	¼	200	2 21/32	25/32	1 5/16
No. 18 Angle	½	¼	100	2 3/4	1 1/4	
No. 18 Straightway	½	¼	100	2 3/4	7/8	1 3/8
No. 18 Offset	½	¼	100	2 3/4	7/8	1 3/8
No. 9 Angle	¾	⅜*	600	3 5/32	1 11/32	
No. 9 Straightway	¾	⅜*	600	3 1/8	13/16	1 1/2

*No. 9 Valve furnished with $\frac{3}{16}$-in. port for pressures above 15 lbs.

†When specified on order, Hoffman Nos. 7, 8, 18 and 19 Valves will be supplied in accordance with measurements adopted by the Heating and Piping Contractors' National Association.

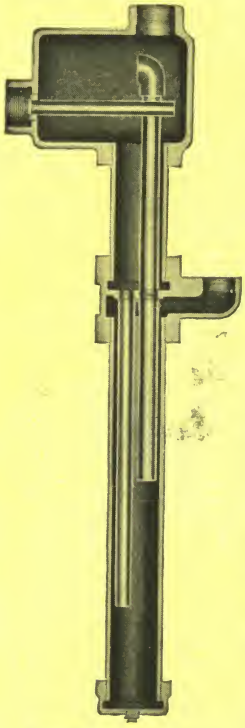
Continued on next page

HOFFMAN CONTROLLED HEAT

Hoffman Differential Loop

To eliminate complicated apparatus for handling condensation and returning it to the boiler it is possible in most cases to permit condensation to return by gravity. This, however, necessitates some control over the boiler water line to prevent water from leaving the boiler if a high pressure is accidentally generated.

The Hoffman Differential Loop is a simple, yet efficient, device, that provides this safeguard. It does not function under normal operation. If, however, a dangerous pressure should be generated, the loop instantly comes into action and prevents damage to the boiler.



Differential Loop

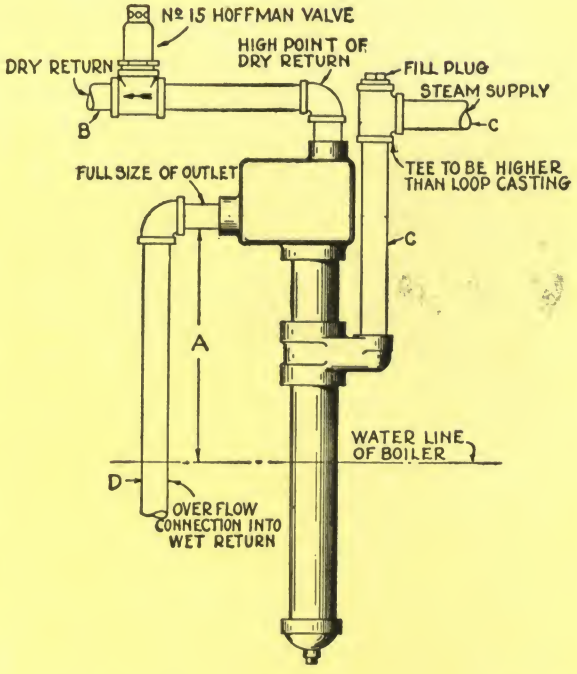
Sold as part of Controlled Heat Equipment.

Prices on loops or basement specialities, for use otherwise, are quoted on application, and sold only when we approve plan of installation.

No. 0 and No. 02 Loops should not be used where the low point in the dry return is less than 24 in. above boiler water line. With the No. 03 and No. 04 Loop this distance must be at least 30 in.

The Loop contains no moving parts to corrode or stick and prevent action at any time when necessary. The operation is obtained through the use of a water column which seals a connection between the steam and return mains until such time as a predetermined pressure is generated, when the connection is unsealed and a small quantity of steam is blown into the return main. This action closes the port of the main vent and compresses the air in the return sufficiently to prevent water from rising beyond the level in the return established by the predetermined pressure. As soon as a sufficient quantity of steam is delivered to the return to accomplish the desired results, the blow-over connection is resealed and remains so until there is need for an additional supply of steam.

When the Loop functions it maintains a fixed differential pressure between the steam and return main. In the standard No. 0 and No. 02 Loops the differential pressure is 10 ounces, while with the No. 03 and No. 04 a 14-ounce differential is maintained. The maintenance of this differential permits circulation of steam throughout the system even though the main vent port is closed. Furthermore, by the maintenance of this differential when the loop has functioned, a radiator which has been turned off may be put into commission and filled with steam in practically the same time as would be required if the Loop had not functioned.



As a positive control over the boiler water line and insurance against damaged boilers, due to forcing out of water under the excessive pressures, the Loop is the simplest and most efficient device on the market.

DIMENSIONS OF LOOP

Loop No.	Capacity, sq. ft.	Dimensions, in.			
		A	B	C	D
0	2000	24	1¼	1¼	¾
02	3500	24	1¼	1¼	¾
03	7500	30	1½	1½	1
04*	15000	30	2	2	1¼

*04 Loops made by siamesing 2 No. 03 Loops with nipples, tees and unions.

No. 15 Valve

In conjunction with the Loop a special valve for venting the entire system is used—the No. 15 Hoffman Vacuum Valve—which permits free venting of air through its ¾-inch vent port and prevents air returning to the system by means of a light check, which is thoroughly reliable in fulfilling its requirements.

No. 15 Valve

The No. 15 Valve is intended for use only in connection with Hoffman Differential Loops.

Venting of Mains

For venting the mains into the dry returns, from two to six, depending on the size of the installation, No. 18 Valves are used. A complete list of Controlled Heat Equipment required for various sizes of installations is given on page 14.

Continued on next page

HOFFMAN CONTROLLED HEAT

Hoffman Damper Regulator

In order that heat may be supplied promptly when there is a demand for it, it is necessary to maintain the pipe lines filled with steam under very low pressure at all times. To prevent the generation of excessive quantities of steam, the rate of combustion in the boiler must be accurately and positively controlled. The Hoffman Damper Regulator fulfills this requirement in that it maintains steam in the pipe lines at all times under uniform pressure and whenever the demand for steam is changed, by opening or closing a No. 7 Valve, the response at the boiler is instantaneous.

Hoffman Damper Regulator

This sensitive operation is obtained through the use of a large diameter rubber diaphragm, which multiplies slight variations in pressure into sufficient power to operate the drafts.

The diaphragm is submerged in water at all times, preventing steam vulcanization of the rubber. To maintain a fixed amount of water on the upper side of the diaphragm at all times a compensating disc is used to occupy the space given up by the diaphragm as it expands in response to a pressure increase. With a constant water load on the upper side of the diaphragm and the balancing of the dampers by means of compensating weights on the lever, the regulator is just as sensitive in closing as in opening the drafts.

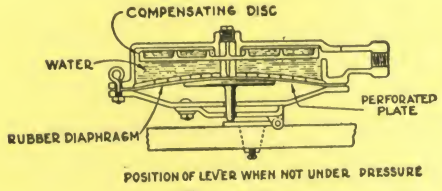


Figure 1

Shows Damper Regulator under no pressure. Compensating disc is in its uppermost position, the bottom of the plate being in line with bottom of inlet. The space above diaphragm is filled with water up to the inlet. Weights on lever are to be so placed that they will hold the diaphragm against the perforated plate. Drafts are held open until the predetermined pressure is generated, when, through diaphragm action which in turn is transmitted to the lever, drafts are closed.

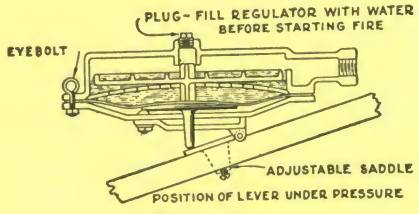


Figure 2

Shows position of Damper Regulator when drafts are closed. Vapor pressure has overcome upward force exerted by the weights on lever arm and forced diaphragm downward. The water on the diaphragm lowers with it and likewise the compensating disc until top of the disc is level with the bottom of the inlet, thus preventing any addition to the water above the diaphragm. With a slight drop in vapor the weights force the diaphragm upward and drafts are opened.

Hoffman Kompo Gage

The new Hoffman Kompo Gage is used with either Hoffman Controlled Heat installations or One-pipe Gravity Steam Heating Systems, equipped with Hoffman No. 2 Vacuum Valves. It accurately indicates the pressure of the vapor being generated in the boiler, or shows whether the plant is operating under vacuum conditions.

The Kompo Gage measures pressure up to 30 pounds, the first 5 pounds being shown in ounce graduations, with a retard from 5 pounds to 30 pounds. Vacuum is shown up to 30 inches, the first 10 inches being indicated in ½-inch graduations, with a retard from 10 inches to 30 inches.

An unusual feature of the Kompo Gage is the externally operated set screw which resets the hand. During shipment it often occurs that the hand is jarred from its normal position at zero. By turning the set screw, without dismantling the gauge or removing the glass, the hand may be reset to zero with perfect assurance that it will register as accurately as when it left the factory.

Coupled with the Hoffman Damper Regulator, this new gauge eliminates all guesswork from the important detail of firing the boiler. The result is marked fuel economy through more efficient firing.

Kompo Gage

The Hoffman Kompo Gage is made in one style only—pressed steel case and ring, finished in dull black, white dial 5 inches in diameter, pressure and vacuum readings in black. Pipe connection is ¼ inch.

Specifications for Controlled Heat

A six-page specification for Hoffman Controlled Heat installations is furnished upon request.

Continued on next page

HOFFMAN CONTROLLED HEAT

Equipment for Controlled Heat

For convenience, Hoffman Controlled Heat Equipment is classified in two groups: Radiator Specialties and Basement Specialties.

Standard Radiator Specialties

Description	Size of connection	Capacity sq. ft. radiation†
No. 7—Modulating Radiator Supply Valve, Lever Handle (Angle Type Only)..... Wood wheel—lock shield—closed top, furnished without extra charge.	¾ in.	200
No. 7—Valve with extended stem	¾ in.	200
No. 7—Valve with chain pull attachment	¾ in.	200
*No. 8—Return-Line Valve or Radiator Trap, ¼ in. Port..	½ in.	200
**No. 9—Return Line Valve or Radiator Trap, ⅜ in. Port..	¾ in.	600

*No. 8 furnished in angle, straightway, right or left-hand corner type.

**No. 9 furnished in angle or straightway only.

Angle type Nos. 8 or 9 shipped unless otherwise ordered.

†Capacity based on 240 B. T. U. per hour.

Standard Basement Specialties

Class "O"—Basement specialties for installations up to 2000 square feet Direct Radiation, consisting of:

2 No. 18 Return Line Valves for venting Steam Mains into Dry Return.

1 No. 0 Hoffman Differential Loop, including one No. 15 Vacuum Valve.

1 No. 13 Hoffman Damper Regulator.

1 No. 14-A Hoffman Kompo Gage.

Class "B"—Basement specialties for installations of 2001 to 3500 square feet Direct Radiation, consisting of:

3 No. 18 Return Line Valves for venting Steam Mains into Dry Return.

1 No. 02 Hoffman Differential Loop, including one No. 15 Vacuum Valve.

1 No. 13 Hoffman Damper Regulator.

1 No. 14-A Hoffman Kompo Gage.

Class "C"—Basement specialties for installations of 3501 to 7500 square feet Direct Radiation, consisting of:

4 No. 18 Return Line Valves for venting Steam Mains into Dry Return.

1 No. 03 Hoffman Differential Loop, including one No. 15 Vacuum Valve.

1 No. 13 Hoffman Damper Regulator.

1 No. 14-A Hoffman Kompo Gage.

Class "D"—Basement specialties for installations of 7501 to 15,000 square feet Direct Radiation, consisting of:

6 No. 18 Return Line Valves for venting Steam Mains into Dry Return.

1 No. 04 Hoffman Differential Loop, including two No. 15 Vacuum Valves.

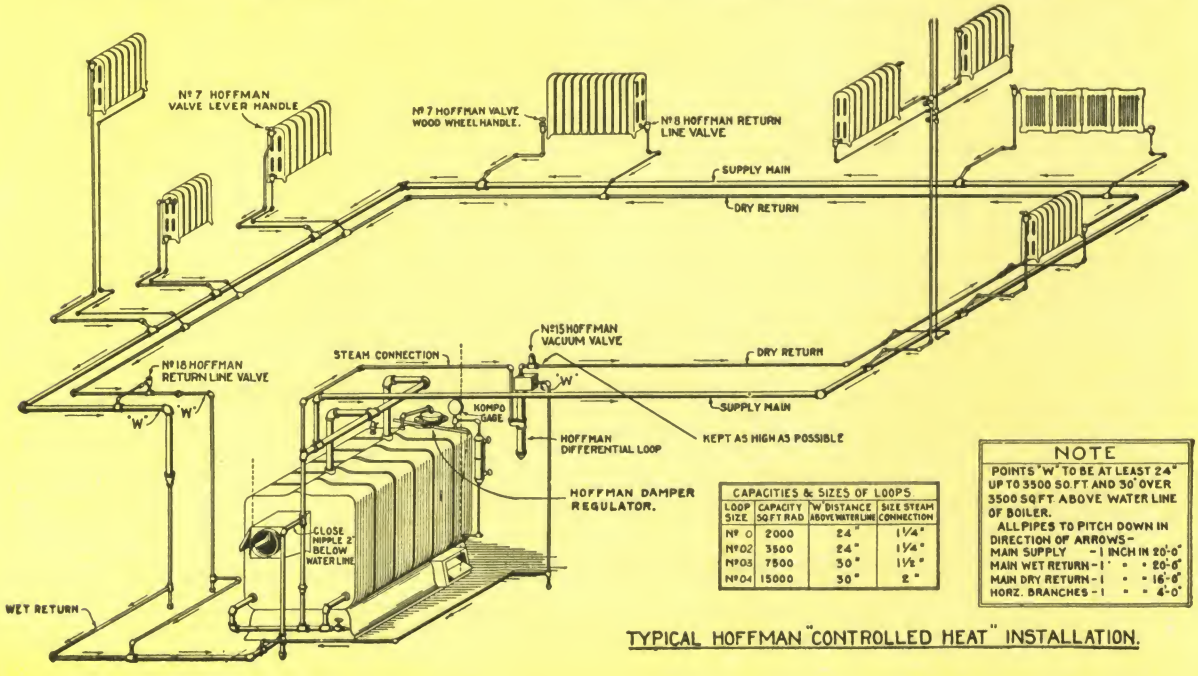
1 No. 13 Hoffman Damper Regulator.

1 No. 14-A Hoffman Kompo Gage.

Additional Basement Equipment

(Occasionally required for large installations.)

Service	Valve No.
Return Line Valves for Venting Air only from Mains, Indirect Radiators, etc., into Dry Return.....	8 or 18
Return Line Valves for Return Connections from Indirect Radiators, Unit, Superfin, Vento or Aerofin Heaters, or to drip Steam Mains, Risers, etc.....	9 or 12
Damper Regulator for Each Additional Boiler	13
Kompo Gage for Each Additional Boiler	14-A



CAPACITIES & SIZES OF LOOPS

LOOP SIZE	CAPACITY SQ FT RAD	'W' DISTANCE ABOVE WATER LINE	SIZE STEAM CONNECTION
№ 0	2000	24"	1¼"
№02	3500	24"	1¼"
№03	7500	30"	1½"
№04	15000	30"	2"

NOTE

POINTS 'W' TO BE AT LEAST 24" UP TO 3500 SQ.FT AND 30" OVER 3500 SQ.FT. ABOVE WATER LINE OF BOILER.

ALL PIPES TO PITCH DOWN IN DIRECTION OF ARROWS—

MAIN SUPPLY — 1 INCH IN 20'-0"

MAIN WET RETURN — 1" " " 20'-0"

MAIN DRY RETURN — 1 " " 16'-8"

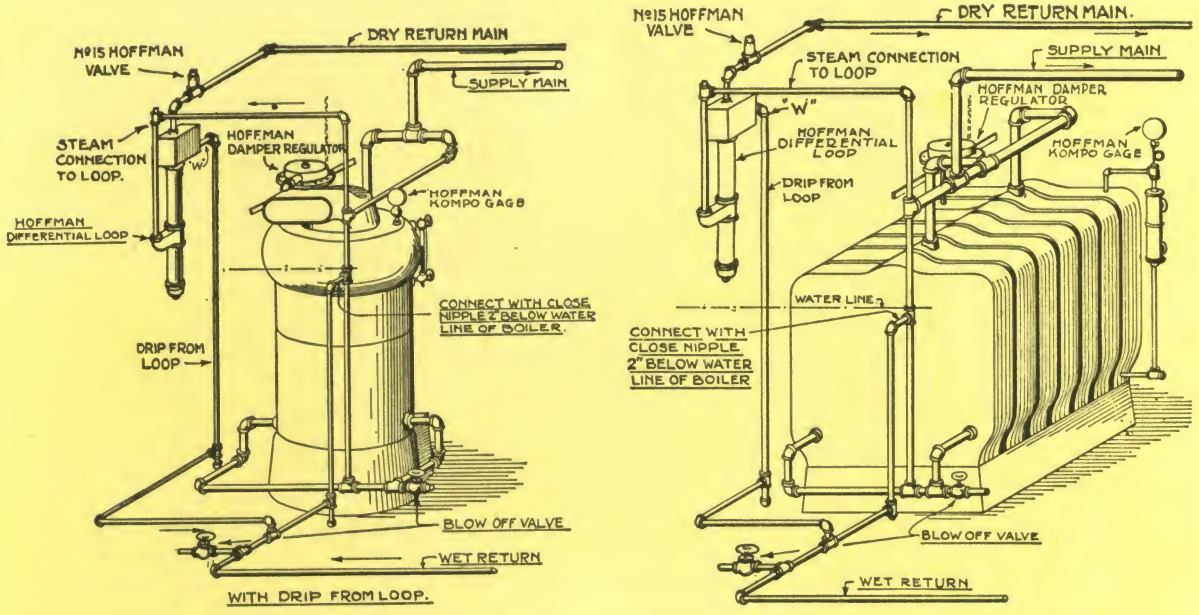
HORZ. BRANCHES — 1 " " 4'-0"

TYPICAL HOFFMAN "CONTROLLED HEAT" INSTALLATION.

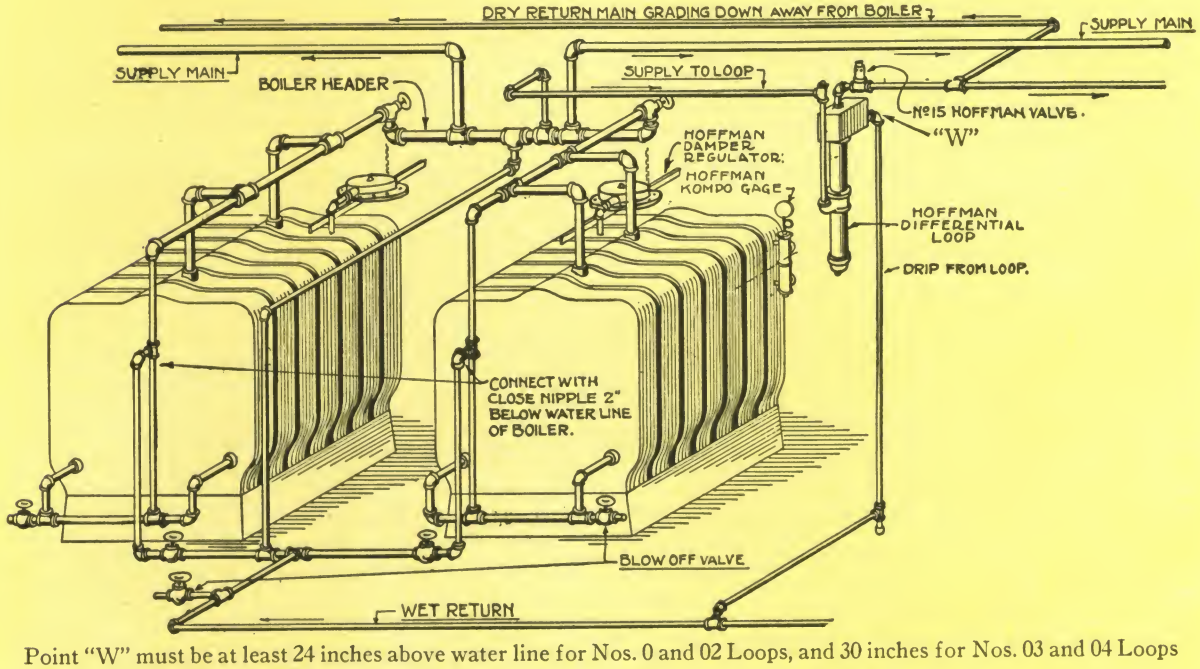
Continued on next page

HOFFMAN CONTROLLED HEAT

Typical Installation Details



Typical Method of Installing Hoffman Equipment on Round and Sectional Boilers

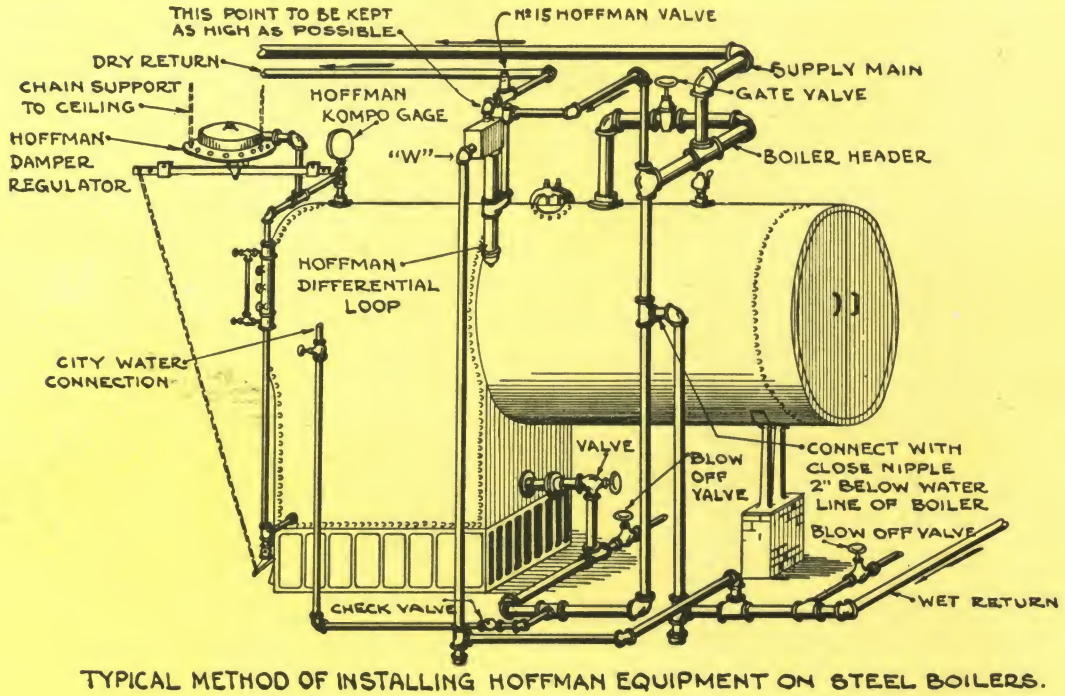


Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

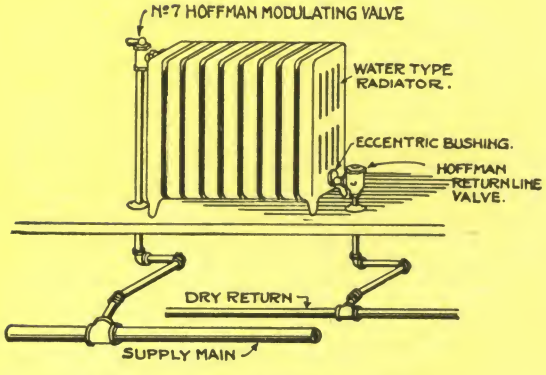
Typical Method of Installing Hoffman Equipment with Twin Boiler Setting

Continued on next page

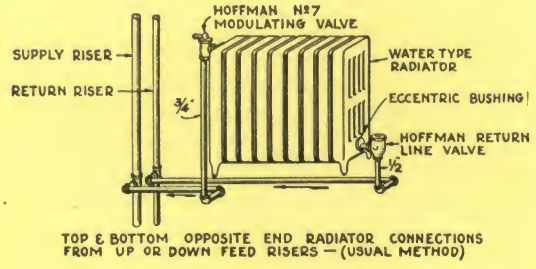
HOFFMAN CONTROLLED HEAT



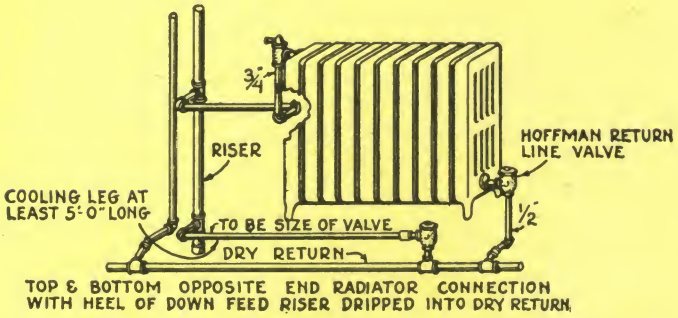
TYPICAL METHOD OF INSTALLING HOFFMAN EQUIPMENT ON STEEL BOILERS.



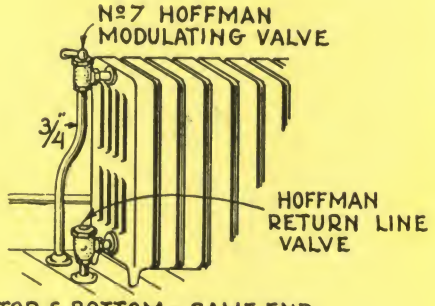
TYPICAL RADIATOR CONNECTION.



TOP & BOTTOM OPPOSITE END RADIATOR CONNECTIONS FROM UP OR DOWN FEED RISERS — (USUAL METHOD)



TOP & BOTTOM OPPOSITE END RADIATOR CONNECTION WITH HEEL OF DOWN FEED RISER DRIPPED INTO DRY RETURN.



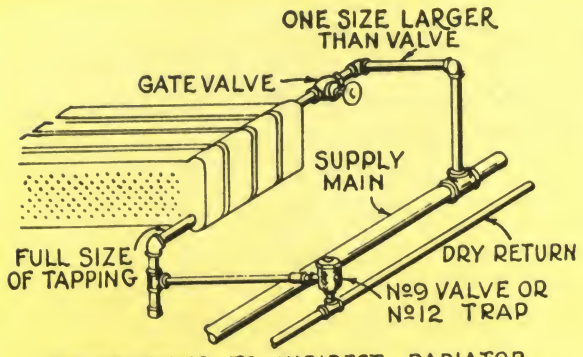
TOP & BOTTOM — SAME END RADIATOR CONNECTION

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

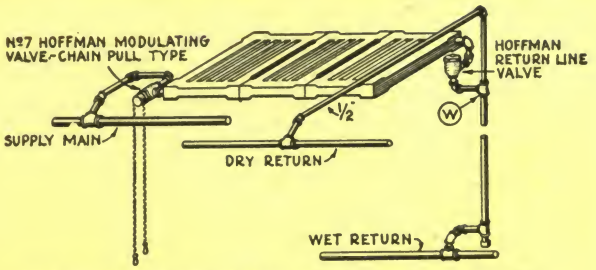
Typical Installation Details

Continued on next page

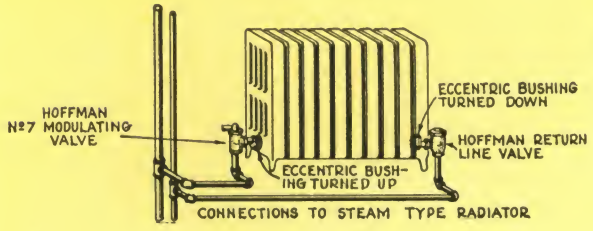
HOFFMAN CONTROLLED HEAT



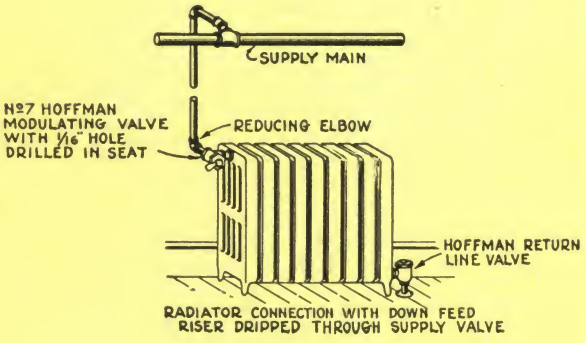
CONNECTIONS TO INDIRECT RADIATOR DRIPPING & VENTING INTO DRY RETURN.



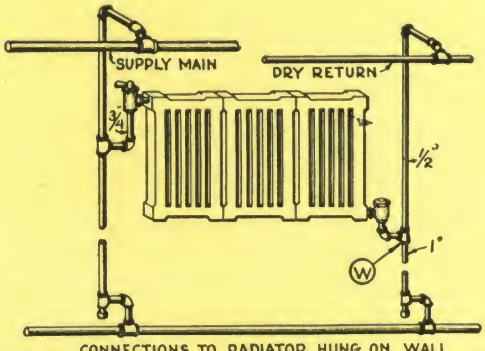
CONNECTIONS TO CEILING RADIATOR WITH RETURN DRIPPED INTO WET RETURN & AIR VENTED INTO DRY RETURN



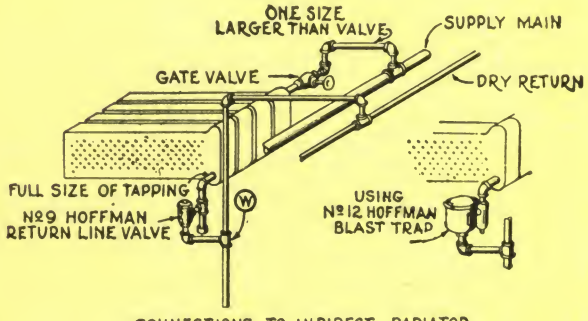
CONNECTIONS TO STEAM TYPE RADIATOR



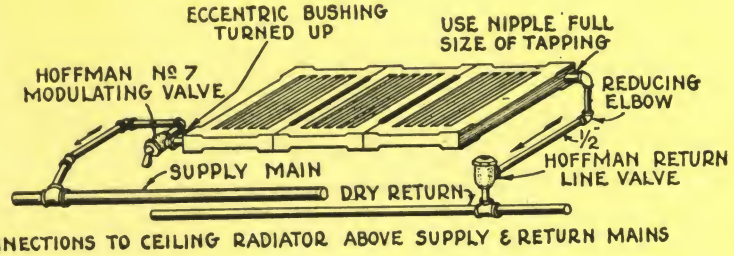
RADIATOR CONNECTION WITH DOWN FEED RISER DRIPPED THROUGH SUPPLY VALVE



CONNECTIONS TO RADIATOR HUNG ON WALL
[WHEN SUPPLY & RETURN DRIPS CONNECT TO WET RETURN AND AIR IS VENTED THRU HOFFMAN VALVE INTO DRY RETURN]



CONNECTIONS TO INDIRECT RADIATOR DRIPPING INTO WET RETURN & VENTING AIR INTO DRY RETURN.



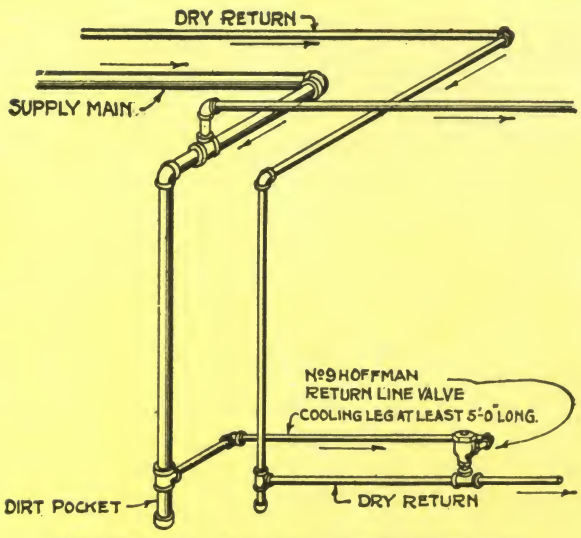
CONNECTIONS TO CEILING RADIATOR ABOVE SUPPLY & RETURN MAINS

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

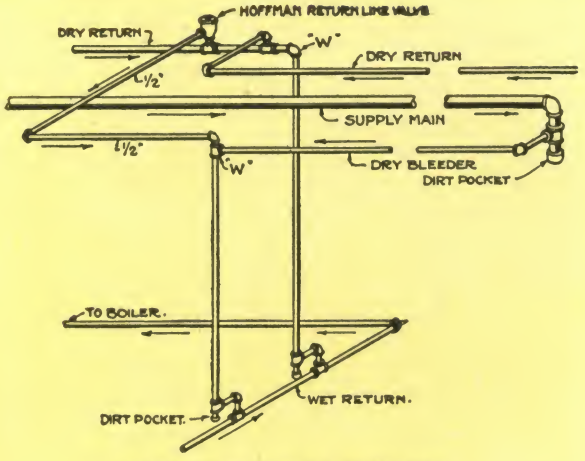
Typical Installation Details

Continued on next page

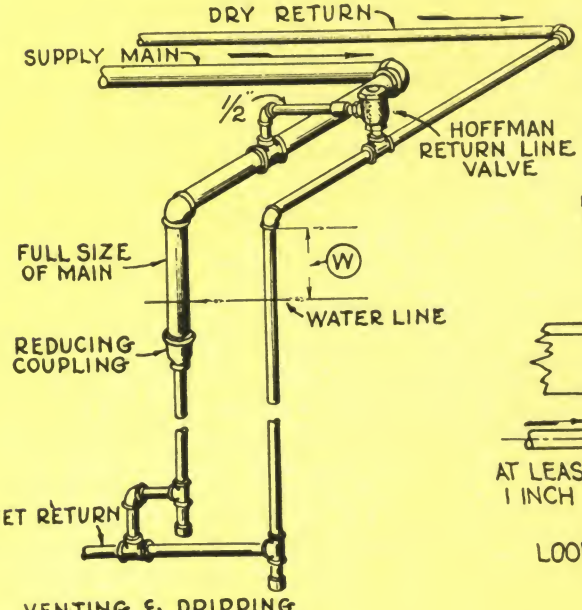
HOFFMAN CONTROLLED HEAT



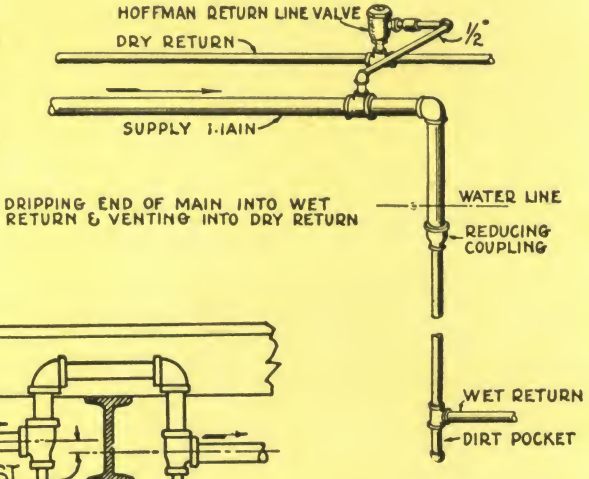
DRIPPING END OF SUPPLY & RETURN MAINS INTO DRY RETURN AT LOWER LEVEL.



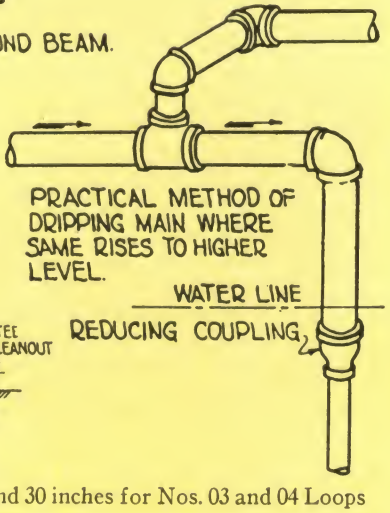
BLEEDING & VENTING END OF MAIN FROM UNEXCAVATED PART OF BUILDING.

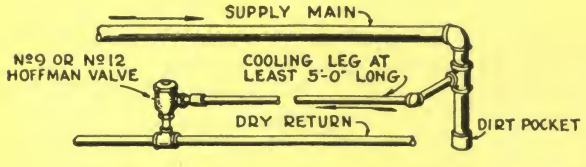


VENTING & DRIPPING ENDS OF MAINS

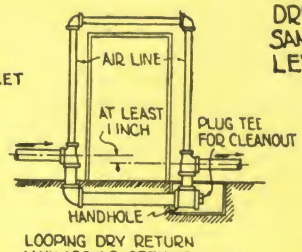


LOOPING MAIN AROUND BEAM.





DRIPPING END OF MAIN INTO DRY RETURN



LOOPING DRY RETURN MAIN AROUND OPENING.

Point "W" must be at least 24 inches above water line for Nos. 0 and 02 Loops, and 30 inches for Nos. 03 and 04 Loops

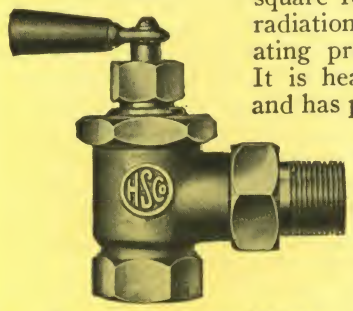
Typical Installation Details

Continued on next page

MISCELLANEOUS HOFFMAN VALVES

No. 19 Hoffman Radiator Valve

Quick-opening, semi-packless type intended for vacuum pump installation or for vapor systems where modulation is not required. Valve is made in ¾-inch size only, having a capacity of 200 square feet direct cast iron radiation; maximum operating pressure 15 pounds. It is heavily nickel plated and has polished trimmings.



No. 19 Radiator Valve
Supplied with lever handle, wood wheel, lock shield, closed top or extended stem

The valve stem is in one piece, the end engaging in disc holder having a quadruple thread which allows full port opening with three-quarters of a turn of handle.

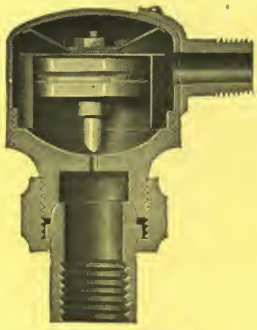
The stem packing is lubricated, compressed asbestos fibre that will last indefinitely and requires no attention other than an occasional take-up of the packing nut. Handle is hard black fibre that withstands severe service without breakage. Valve disc is genuine Jenkins Bros. composition.

Regularly supplied in lever handle type. On special orders, wood wheel handles, lock shields, closed tops or extended stems furnished.

No. 3 Hoffman Air Line Valve

The No. 3 Hoffman Air Line Valve is a compact all-metal valve for air line or Paul Systems, where an exhaust line is carried from the valve back to a central point where in many cases air is drawn out of the system by a vacuum pump.

Normally the port is open for the passage of air and remains so until steam reaches it, when the thermostatic member instantly closes the discharge port tightly and no steam escapes into the air line.



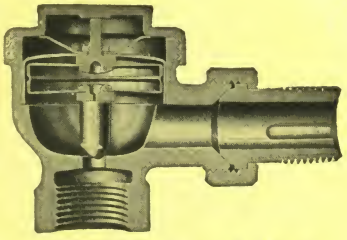
No. 3 Valve
Radiator connection, ⅛ in.; air line connection, ¼ in. Maximum guaranteed operating pressure, 10 lbs.

With proper instaliation of air line systems no difficulty is encountered with water logged radiators, but if water is present in the system in excessive quantities and thrown against the No. 3 valve it will escape into the air line. To allow for unforeseen conditions, the use of an automatic water feeder is recommended on all boilers in air line systems.

The Hoffman-Economy Air Line Pump (see page 40) is intended for accelerating the removal of air from these systems and maintaining a vacuum on the air line.

No. 18 Hoffman Return Line Valve

This valve is similar in construction and basic principle to the No. 8 Hoffman Return Line Valve. It is used where radiator units contain not over 100 square feet of direct cast iron radiation, and the pressure at the trap not in excess of 15 pounds. The thermostat consists of one chamber made by two diaphragms separated by a space ring to which they are fastened. In the center of the bottom diaphragm the valve pin is attached. The joint being expanded and soldered remains absolutely tight. The thermostat is held in its cage by a pin expanded and attached to the top diaphragm, this pin extending through the cage and engaging with the boss on the cap. All thermostats are interchangeable.



No. 18 Return Line Valve
Made in ½ in. size only and is furnished in angle, straightway, right and left hand offset patterns. Maximum guaranteed pressure is 15 lbs.

No. 11 Hoffman Vapor Vacuum Valve

This valve is used for venting return mains in vapor vacuum systems or for other conditions where a large venting capacity is required. Valve has a ¾-inch vent port. For preventing the escape of water the valve has a large buoyant float with a double valve, one disc controlling ¾-inch port and the other an auxiliary port $\frac{3}{16}$ inch in diameter. If water enters the valve, closing off the port, and then recedes, the $\frac{3}{16}$-in. port is first opened and as air pressure is relieved slightly the ¾-inch port opens and full venting area obtained. Above the float-controlled port is the thermostat which controls a ¾-inch single valve port. An air check over the discharge port prevents return of air to system.

For preventing damage to valves in shipment a set screw is used to hold the float tightly against its seat. It is necessary that the set screw be backed away before valve is installed.

No. 11 Vapor Vacuum Valve
Valve has ¾-in. pipe connection and is guaranteed for operating pressures up to 15 lbs.

Continued on next page

MISCELLANEOUS HOFFMAN VALVES

No. 12 Hoffman Blast Trap

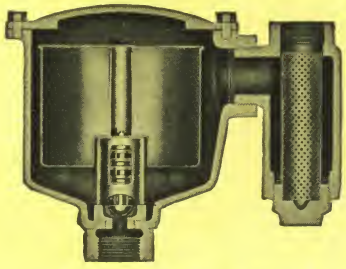
Especially well adapted for draining condensation from:

Indirect Radiators
Blast, "Vento" or "Superfin" Stacks
Unit Heaters
Ends of Steam Mains and Risers
Dryers and Drums
Hot Water Generators
Laundry Machinery

In functioning it distinguishes between steam, heated air and water of condensation, giving free discharge of air and condensation.

The trap embodies the desirable feature of open bucket or float traps in that it relieves condensation immediately upon its arrival at the trap regardless of the water temperature. Combined with the float is a thermostatic member which positively overcomes the chief difficulty with float traps by automatically relieving air as well as condensation from the system.

The normal position of the valve is open and this is held until steam reaches it when it closes tightly. If small quantities of condensation flow to the trap the thermostat functions and relieves the water, but if larger amounts of condensation, beyond the capacity of the port controlled by the thermostat reach the trap, the float lifts the thermostat from its seat and opens the large port. Maximum capacity is thus obtained.

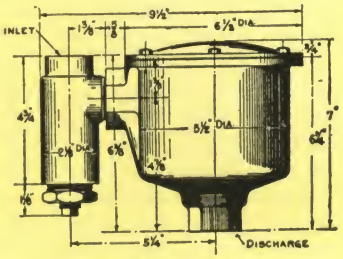


No. 12 Blast Trap
Pipe connections with strainer, 1 in. inlet and outlet.

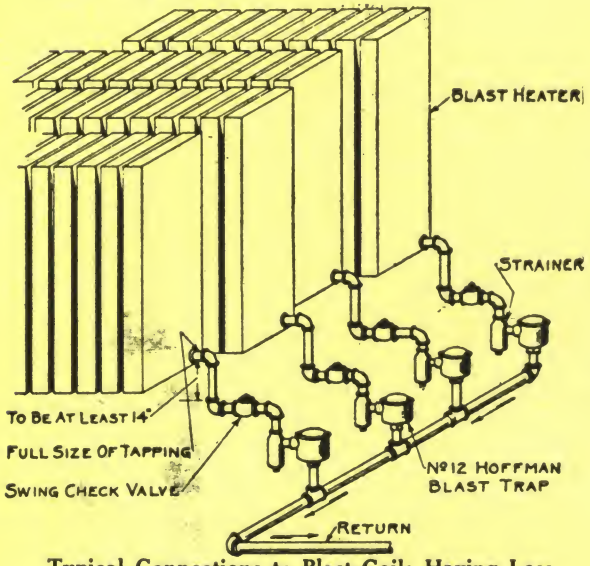
TABLE OF NOMINAL CAPACITIES

Pressure, lb. per sq. in.....	½	1	2	3	4	5
Capacity, lb. per hr.	800	1,000	1,500	1,800	2,000	2,500
Capacity in sq. ft. radiation with ¼ lb. condensation per sq. ft. per hr.	3,200	4,000	6,000	7,200	8,000	10,000

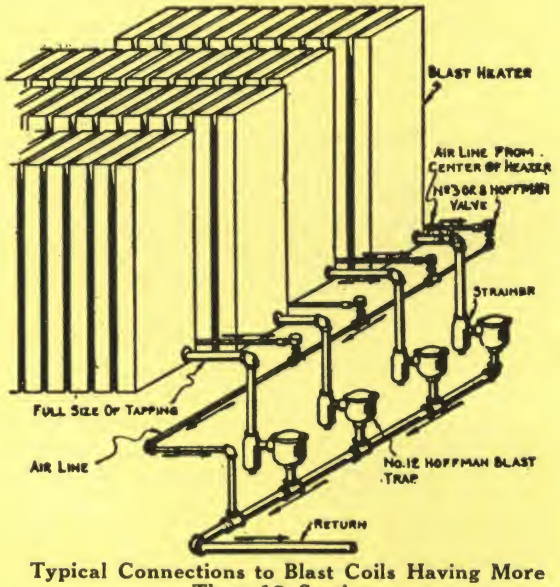
Maximum guaranteed operating pressure 30 lbs.
Capacities for over 5-lbs. pressure furnished on application.



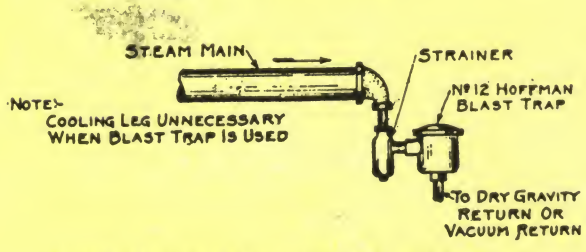
Dimension Diagram



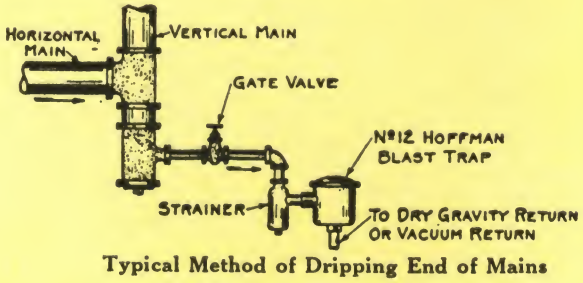
Typical Connections to Blast Coils Having Less Than 12 Sections



Typical Connections to Blast Coils Having More Than 12 Sections



Typical Method of Dripping End of Mains



Typical Method of Dripping End of Mains

Continued on next page

MISCELLANEOUS HOFFMAN VALVES

Hoffman Thermostatic Steam Traps

Nos. 20 and 21 Steam Traps
Pressure Range 0 to 100 Pounds without Change or Adjustment

Construction

The Hoffman Steam Trap is of strong, rugged all bronze construction. The diaphragms in the thermostat, the valve pins and valve seat are all made of the same non-corrosive alloy which has been successfully used for diaphragms in Hoffman Valves for a number of years. The alloy withstands high temperature steam without softening, and repeated action without cracking. It also withstands the scoring action of steam, hence its use in the wearing parts.

A strainer attached to a plug is built into the trap body permitting ready removal for cleaning. All renewable parts are interchangeable, permitting replacement without change or adjustment of any sort.

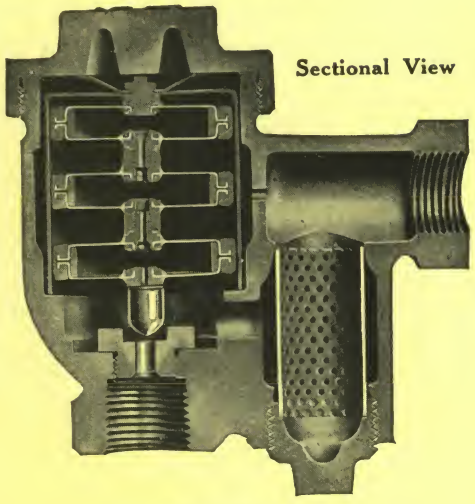
Advantages

The Hoffman Steam Trap is easy to install and may be placed directly in the pipe line without requiring hangers or supports. It is made in Angle Pattern, saving one fitting. It has only one moving part which expands in a straight line, with no levers or hinged joints to stick.

The Hoffman Steam Trap normally has a wide open vent port which is maintained until all air and condensation are relieved from the system, after which steam contact with the thermostat closes the port. No hand operated by-passes are required to vent air from the system. The trap cannot air-bind or freeze.

The opening and closing of the port are practically instantaneous. By means of a cooling leg condensation is held a short time until its temperature drops sufficiently below that of steam to contract the thermostat and permit a full port opening. The length of cooling leg permits the engineer to vary the trap capacity and number of discharges.

The Hoffman Steam Trap has the thermostat on the inlet side of the trap and sensitive accurate action is obtained thereby. Compared with traps having thermostatic members on the discharge side of the port, a considerable saving in steam in the course of a year is possible.



Sectional View

Operation

The uniform operation of Hoffman Steam Trap throughout its wide pressure range is due to the constant relationship between the fluid pressure within the thermostat and the external steam pressure. When the thermostat is in contact with steam the internal fluid pressure generated is such that the diaphragms are fully expanded and the discharge port closed. When water or air at temperatures below that of steam reach the thermostat a reduction in fluid pressure occurs and the steam pressure compresses the thermostat, thus opening the port by an amount directly proportional to the fluid pressure loss within the thermostat. As the fluid pressure loss is dependent on the temperature of the air or condensation surrounding the thermostat, it will be seen that the lower the temperature of condensation the greater the pressure loss and the wider the port opening. The necessity for and influence of a cooling leg on trap capacity is thus clearly indicated.

Capacity

The discharge capacity of Hoffman Steam Traps is dependent upon differences between the temperature of condensation delivered to the trap and steam temperature. The following tables give continuous discharge capacities:

CONTINUOUS DISCHARGE CAPACITY NO. 20 TRAP
Pounds of water per hour

Pressure per sq. in., lb.	Temperature drop			
	20°	25°	30°	35°
10	275	450	600	725
20	425	615	775	900
30	550	750	940	1075
40	640	860	1075	1225
50	715	960	1210	1380
60	775	1050	1340	1540
70	820	1130	1440	1675
80	860	1200	1510	1760
90	900	1250	1560	1830
100	925	1260	1590	1860

Pipe connections. in.
Trap No. 20..... ½
Trap No. 21..... ¾

CONTINUOUS DISCHARGE CAPACITY NO. 21 TRAP
Pounds of water per hour

Pressure per sq. in., lb.	Temperature drop			
	20°	25°	30°	35°
10	375	610	800	950
20	575	825	1050	1200
30	725	985	1250	1410
40	835	1150	1450	1640
50	925	1285	1620	1860
60	1010	1410	1775	2075
70	1085	1525	1900	2250
80	1150	1600	2010	2400
90	1190	1660	2090	2490
100	1225	1725	2140	2550

Port Diam., in.	Weight, lb.
¾	3¼
1	3¾

Continued on next page

PART II

Hoffman-Economy Pumps

VACUUM PUMPS

CONDENSATION PUMPS

RECIPROCATING PUMPS

UNDERGROUND PUMPS

AIR LINE PUMPS

Condensation or vacuum pumps are widely used in heating systems for all classes of buildings where accelerated circulation at low pressure is desired or where condensation cannot return to boiler by gravity.

Hoffman-Economy Pumps offer to architects, engineers and heating contractors a line of products designed and built to meet the most exacting requirements. The basic engineering principles are scientifically correct—materials and workmanship are of the finest grade—and the units are sturdily constructed in every detail.

Hoffman-Economy Pumps are manufactured in a complete range of sizes for all types of installations requiring such equipment; and can be specified with the definite assurance that they will give years of efficient service with minimum maintenance.

GUARANTEE

Hoffman-Economy Pumps are guaranteed for capacity and against defects in material or workmanship for a period of one year from the date of installation. This guarantee applies to the pump only and covers the furnishing of new parts to replace those found defective. The guarantee applying to motors and electrical equipment is the same as that given by the manufacturer of the motor or equipment used or specified.

It is a condition of purchase that HOFFMAN SPECIALTY CO., INC. shall not be held liable for any damage or delay which may be caused by defective material and that no allowance for labor will be made for the replacement of parts claimed defective without written consent of HOFFMAN SPECIALTY COMPANY, INC.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Uses and Selection of Hoffman-Economy Pumps

Vacuum Heating Systems

Return Line Vacuum Systems—On large installations, where it is desired to accelerate steam circulation at low pressures by maintaining a vacuum on the return mains, a Hoffman-Economy Return Line Vacuum Pump provides rapid removal of air from the system and the return of condensate to the boiler. See pages 24 to 29.

Air Line Systems—On air line or "Paul" systems, a Hoffman-Economy Air Line Vacuum Pump is used to remove air from the system. The pump, however, handles no condensate and does not act as a boiler feed pump. See page 40.

Gravity Heating Systems

Low Pressure—*For Drainage of Radiation Below Water Line* . . . In installations where part of the radiation is below the boiler water line, it is only necessary to provide a pump of sufficient capacity to handle the condensate from these units, allowing condensate from radiators on upper floors to return to the boiler by gravity.

For Acceleration of Circulation . . . In many installations, especially those covering a large area, where the distances between the boiler water line and the low point of the piping system are not sufficient to compensate for the friction in the pipe lines, the use of a pump and receiver will improve circulation of steam. It will also insure prompt return of condensate to the boiler. This permits lower boiler pressure with resultant saving in fuel.

Medium and High Pressures (35 to 100 pounds square inch)—On installations where pressures above 25 pounds are required only part of the time, electric condensation pumps replace steam driven pumps and traps for returning condensate to the boiler. Steam driven devices require the maintenance of a predetermined boiler pressure to insure their operation, even though steam is not required for other purposes. On such jobs electric pumps reduce fuel consumption, permit banking fires at night and over week-ends and operate without attention.

When steam is required for process work and where all condensate is not returned to the boiler, electric condensation pumps are used for returning condensate and for automatically feeding makeup water by the addition of a float controlled water feeder.

How to Determine Correct Pump—Wherever condensate will drain to the horizontal receiver, a Horizontal Pump is recommended. See pages 30 to 36.

Where returns are below floor level or where condensate cannot flow by gravity to horizontal tank, a Vertical Underground Pump should be selected. See pages 38 and 39.

In factories or where pressures of 50 to 100 pounds are carried and where lower initial cost is a factor and slight noise not objectionable, a Reciprocating Pump may be substituted for a horizontal pump. See page 37.

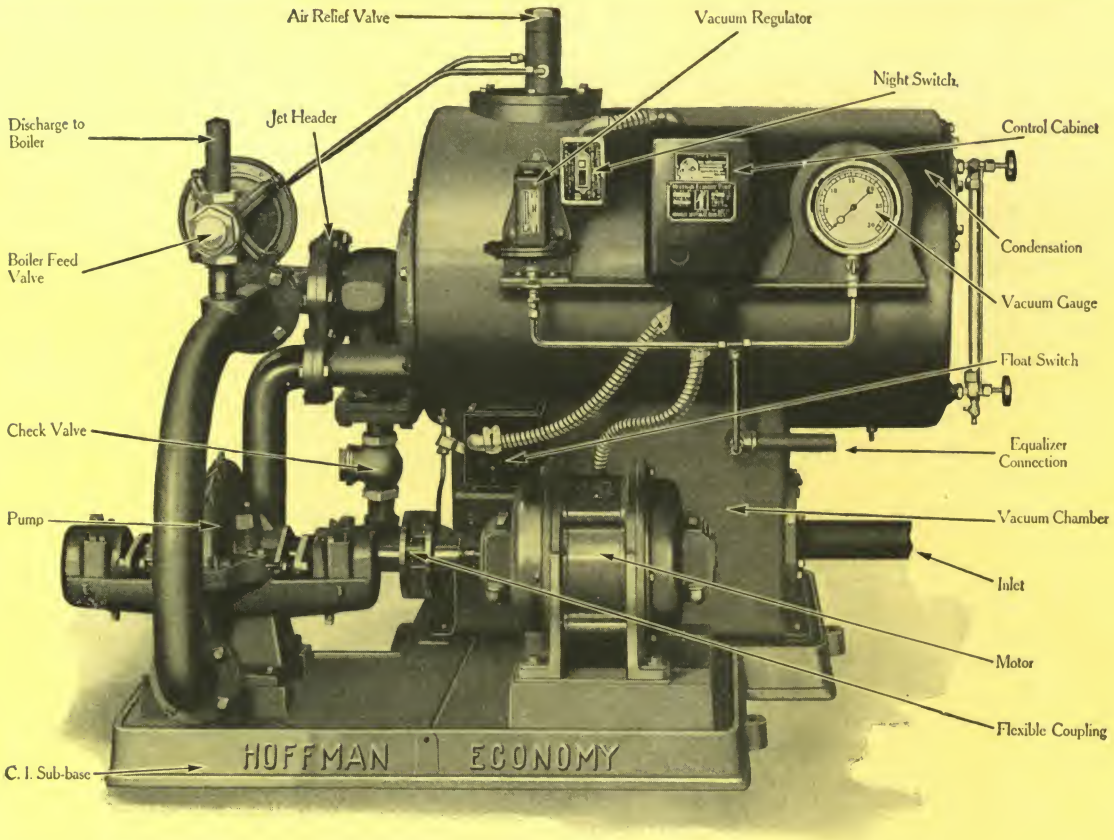
How to Determine Electric Current Available

In various parts of the country or sometimes in the same city, different electric currents are available. It is, therefore, necessary to ascertain from the architect, electrician or power company the current furnished to the building. Often this information is given on the name plate of the electric power meter.

Alternating current may be one, two or three phase, 110, 220, 440, or 550 volts and 60, 50, 40, 30, or 25 cycles. Two or three phase power is usually found where there is a total of 5 hp. or more in a single building. If there is only a lighting line the current will probably be single phase or direct current. Care must be used in selecting pumps having motors 3 hp. and over, as power companies frequently run in two or three phase lines to operate motors of this size. If, therefore, there is only a lighting circuit in the building and it is desired to use a large pump, inquire of the power company what current will be furnished.

Continued on next page

HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Return Line Vacuum Pumps Single and Duplex Units

The Hoffman-Economy Return Line Vacuum Pump performs three functions: it removes air from the heating system; maintains a vacuum on the return mains for lifting condensate, if necessary; and returns condensate to the boiler.

Efficiency—The jet type vacuum producer used in these pumps is the simplest and best known method for exhausting air and vapors. It has no moving parts and avoids close clearances on pump; difficulties in maintaining vacuum due to wear are reduced to a minimum.

Pumps can handle extremely hot water and are smooth and quiet in operation.

Unit is capable of producing a vacuum of 25 inches in all sizes and a considerably higher vacuum in sizes SV-4 and larger.

Dependability—Special arrangement of relief valve eliminates danger of water overflowing to floor, even in event of current failure.

The pump being submerged always maintains its water seal; under normal conditions there is no possibility of pump running dry and requiring priming.

Because pump maintains a constant pressure on the jets the motor load is constant, thus insuring longer life of motor.

Easy to Install and Service—Return inlet is located 8½ to 15½ inches above floor. In many installations it is possible to have water return by gravity, whereas with other pumps lift fittings or a pit would be required.

The use of standard motors permits replacement from local stocks when necessary.

All operating parts are readily accessible without dismantling unit.

Duplex Units—Duplex units consist of a single tank with one set of jet vacuum producers, one float switch, two pumps, two motors and two vacuum regulators. Each pump is valved so that access may be had to one pump without interrupting the operation of the other.

All standard pumps are adapted for pressures up to 20 pounds, except Nos. SV-0 and DV-0 which are designed for 10 pounds pressure. High pressure units or steam turbine drive can be furnished when desired.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Construction Details

Centrifugal Pump—All units of 16,000 square feet capacity and over have horizontal split case centrifugal pumps, which are fitted with enclosed type, double suction, non-overloading bronze impellers, carefully machined. Shaft is of alloy steel turned and ground all over.

Bearings are of renewable bronze ring oiling type mounted in large oil wells. Construction of bearing housings prevents escape of oil and excludes water and dust. Oil level cups and inspection holes are fitted with spring hinge covers.

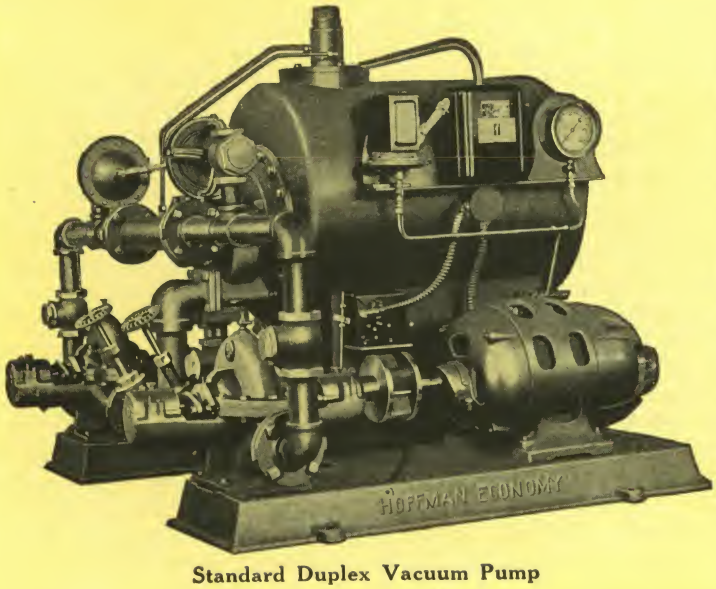
Pumps of 12,000 square feet capacity and under have vertically split volute pumps with enclosed bronze impellers, renewable bronze stand bearing and outboard ball bearing. All impellers are carefully balanced and hand filed on the interior to insure smooth, efficient operation.

Jet Vacuum Producer—Hoffman-Economy jet vacuum producer is extremely simple in construction and has been thoroughly tested both in the laboratory and in actual service. It consists of the manifold and body, into which are fitted brass pressure nozzles and the venturi discharge tubes. These parts are all flanged and bolted together. Multi-jets are used to increase capacity.

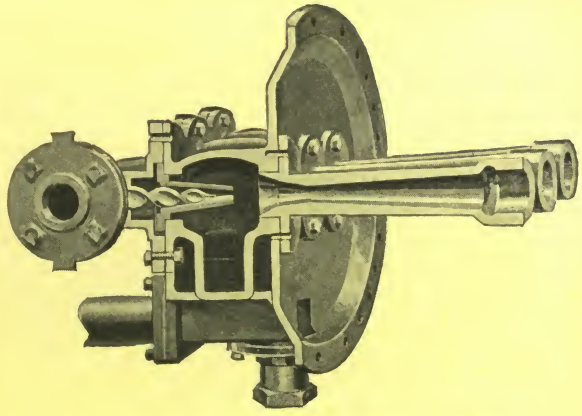
Tanks—Tanks are of a heavy gauge welded steel. Lower tank acts as a pedestal and serves as an accumulator, while upper tank holds the circulating water and controls the feeding of water to the boiler.

Lower tank has two compartments, one serving as a combined baffle and sediment chamber which removes all dirt and scale before reaching the accumulator chamber.

An underground auxiliary accumulator tank may be substituted for lift fittings where radiation or returns are below pump level.



Standard Duplex Vacuum Pump



Cross Section of Jet Vacuum Producer

Motors—Motors have liberal overload capacity and are guaranteed against a temperature rise greater than 40° when operating at full load.

Single phase 1 hp. 110 volts and 1½ hp. 220 volts motors and larger are equipped with magnetic contactors with thermal overloads. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts.

Magnetic contactors with overload and no voltage release are used in 2 hp. sizes and larger.

Smaller sizes are controlled directly by float switch.

Direct current motors 1 hp. and over are equipped with automatic starter having overload protection. Smaller motors are controlled directly by float switch.

Connection between the smaller pumps and motors is by means of pin and strap type flexible couplings. In units requiring 7½ hp. or more, rubber bushing couplings are used.

Automatic Control — The automatic control supplied as standard equipment consists of automatic starter, double pole vacuum regulator and float switch, all of standard make enclosed type.

Automatic starters are used on large units so that vacuum regulators and float switches carry only pilot currents. All wiring conforms to National Electric Code.

Boiler Feed Control Valves—The diaphragm operated boiler feed valve is a single seated valve controlled by a pilot in the pump discharge. This valve closes tightly without water hammer and lasts indefinitely. All parts are readily accessible for inspection or cleaning.

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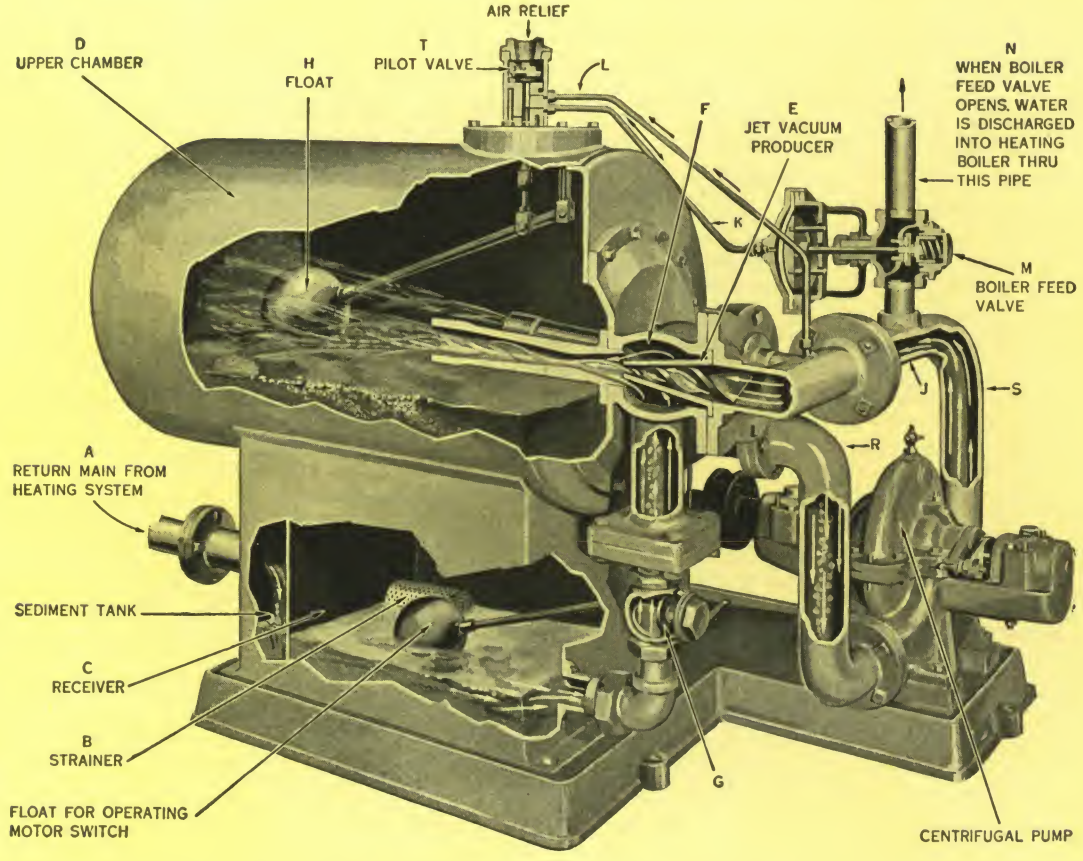
HOFFMAN-ECONOMY PUMPS



How Return Line Vacuum Pump Operates

Before starting pump, the upper chamber D should be half filled with water. The pump upon being started will circulate this water through circuit RSJ and by the discharge of water from jet E a partial vacuum is formed in chamber F, which lifts check G and permits air and condensation which has flowed through strainer B into receiver C to be lifted into upper chamber D.

If return main A is so located that condensation cannot flow into receiver C by gravity, vacuum is first created in C and the water is then drawn up from a lift pocket at the low point in the return.

When upper chamber D receives its full charge of water, float H rises, lifting pilot valve T and permitting the passage of water from line J (which is under approximately 30 pounds pressure) to pass through lines L to K to boiler feed valve M, which is opened and condensation is discharged through line N directly to boiler. When water in D recedes, pilot valve T is closed and, with pressure relieved from diaphragm in valve M, the boiler feed valve closes, remaining so until the cycle is repeated.

This operation continues until the required vacuum is obtained, when the automatic vacuum regulator* comes into action and stops the pump, provided the float switch* is in the off position. When vacuum in the system drops to the minimum setting or when sufficient condensation has collected in receiver C to operate float switch, the pump is again started.

If it is desired to operate the pump on float control only, the switch in the vacuum control circuit can be opened and the pump permitted to operate without maintaining any predetermined vacuum.

Because of the constant head pressure of cool water in upper chamber D and lines RSJ and the mixture of this cool water with the hot water flowing through check G, it will be readily seen why the Hoffman-Economy Pump handles hotter water than other vacuum pumps.

*Illustrated on page 24.

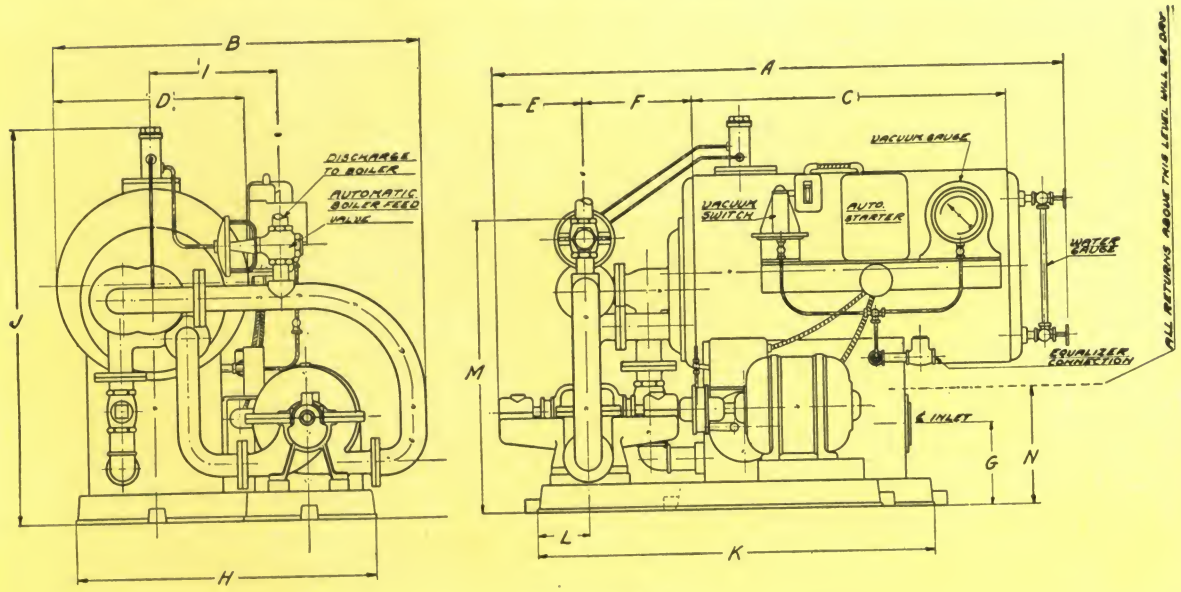
Tested and Guaranteed

Every Hoffman-Economy Vacuum Pump is carefully tested before shipment for capacity, pressure, etc. and permanent record retained at factory. Pump is guaranteed for capacity and against defects for a period of one year.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Table of Dimensions
Hoffman-Economy Return Line Vacuum Pumps



SINGLE PUMPS

Pump No.	Cap. sq. ft. direct cast iron radiation	Water cap. g.p.m.	Air cap. cu. ft. min.	Orifice size,* in.	Motor, hp.	Size discharge conn., in.	Size of return inlet, in.	Approx. shipping wt., lb.†	Dimensions in inches (These dimensions are approximate and must not be used for construction)												
									A	B	C	D	E	F	G	H	I	J	K	L	M	N
SV-0§	1,500	3	1	1/16	1/2	3/4	1 1/4	400	Furnished on application													
SV-1A	3,500	7	3	5/32	3/4	1	1 1/2	700	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-2	5,000	9	3	7/64	1	1	1 1/2	750	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-2A	7,000	13	4	1/8	1	1	2	750	49 1/2	29	30	18	10 1/2	2	11 1/2	28	13	40	31		29	12
SV-3A	12,000	18	7	11/64	1 1/2	1	2 1/2	950	56 1/2	39	30	20	9 1/2	12	8 1/2	31	13 1/2	41 1/2	45	6 1/2	31	12
SV-4	16,000	22	9	3/16	2	1 1/4	3	1025	56 1/2	39	30	20	9 1/2	12	8 1/2	31	13 1/2	41 1/2	45	6 1/2	31	12
SV-5	20,000	28	12	7/32	3	1 1/4	3	1150	58	46	30	24	10 1/2	12	9	37	18 1/2	46	50	7 1/2	33	12 1/2
SV-6	26,000	35	15	1/4	5	1 1/2	3	1300	58	46	30	24	10 1/2	12	9	37	18 1/2	46	50	7 1/2	33	12 1/2
SV-7	40,000	60	21	9/32	5	1 1/2	4	1550	64	47	36	26	10 1/2	12	11	37	18 1/2	48	50	7 1/2	34	13
SV-8	65,000	90	34	11/32	7 1/2	2	5	1800	69 1/2	52	42	28	10 1/2	12	11	41	21	54	57	7 1/4	41	14
SV-9	100,000	140	50	7/16	10	2 1/2	8	3100	78	64	54	36	11	12	15	48	23 1/2	66	62	8 1/2	52	18
SV-10	150,000	210	102	9/16-5/8	15	2 1/2	10	4000	84	72	60	42	11	12	15 1/2	54	25	72	70	9 1/2	58	18 1/2
SV-11	250,000	350	130	23/32	25	4	12	6000	Furnished on application													

*Size of sharp edge orifice in 1/8-in. plate through which pump maintains 10-in. vacuum.
†Weights of 25 cycle units will be approximately 33 1/3 % in excess of weights listed.
§SV-0 discharge pressure, 10 lb.
Note: Dimensions are for 20-lb. pumps only. Dimensions of high pressure pumps furnished on application.

Auxiliary Accumulator Tanks for Use with Vacuum Pumps

In many installations where returns are brought back to the pump below floor level, it is desirable to operate the pump during the day under vacuum and float control, while at night the vacuum control is cut out. By using Hoffman-Economy Accumulator Tank it is possible to let condensation flow to tank by gravity and by means of a float control in tank operate the pump without maintaining a predetermined vacuum. The tank is made of cast iron, equipped with Float Control and Lift Fitting and may be placed so that cover will be flush with floor. In such installations the vacuum control on pump should be connected to the auxiliary tank or return before it enters the pump.

STANDARD SIZES

Tank size		Suitable for draining sq. ft. rad.	Capacity gallons per ft. depth	Approximate shipping weight, lb.
Diam., in.	Depth, in.			
16	30	12,000	10.4	350
20	30	20,000	16.3	500
24	30	26,000	23.4	650
30	36	40,000	36.6	1,000
30	48	65,000	36.6	1,200
36	48	100,000	53.0	1,600

Tanks longer than standard may be furnished in two sections. In such case, flanges are faced and bolts and gaskets furnished for assembly.

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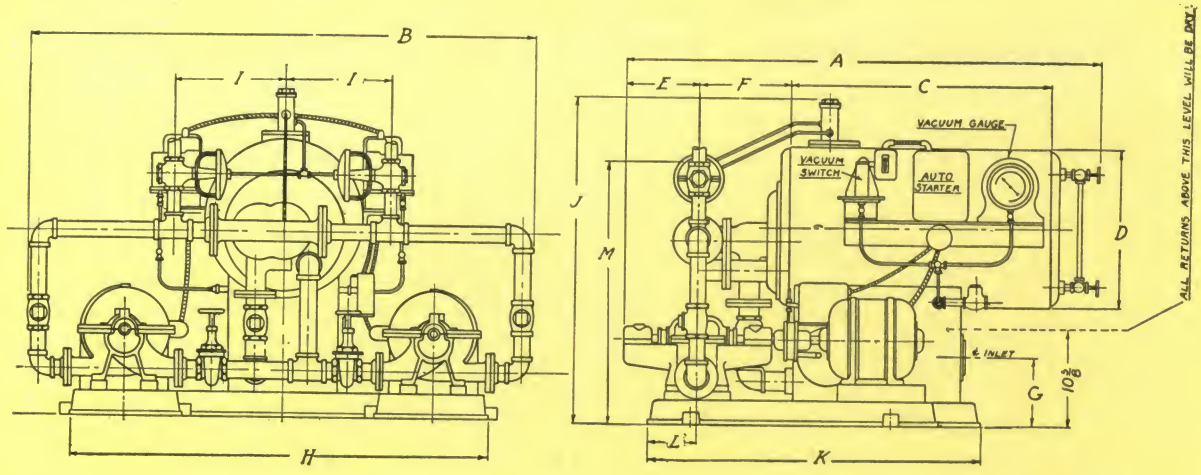
HOFFMAN-ECONOMY PUMPS



DUPLEX PUMPS

Pump No.	Cap. sq. ft. direct cast iron radiation	Water cap. g.p.m.	Air cap. cu. ft. min.	Orifice size,* in.	Motor, hp.	Size discharge conn., in.	Size of return inlet, in.	Approx. shipping wt., lb.†	Dimensions in inches (These dimensions are approximate and must not be used for construction)														
									A	B	C	D	E	F	G	H	I	J	K	L	M	N
DV-0§	1,500	3	1	1/16	½	¾	1¼	800	Furnished on application													
DV-1A	3,500	7	3	5/32	¾	1	1½	1200	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-2	5,000	9	3	7/64	1	1	1½	1300	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-2A	7,000	13	4	1/8	1	1	2	1300	50½	50	30	18	9½	4½	8	45½	‡	40	33	1½	29	12
DV-3A	12,000	18	7	11/64	1½	1	2½	1600	57	65½	30	20	9½	12	9	53½	13½	42	45¼	6	29½	12
DV-4	16,000	22	9	3/16	2	1¼	3	1800	57	65½	30	20	9½	12	9	53½	13½	42	45¼	6	31½	12
DV-5	20,000	28	12	7/32	3	1¼	3	2000	59	71½	30	24	10½	12	9½	57	18½	46½	48	6	33½	12½
DV-6	26,000	35	15	¼	5	1½	3	2280	59	71½	30	24	10½	12	9½	57	18½	46½	48	6	33½	12½
DV-7	40,000	60	21	9/32	5	1½	4	2700	65	73	36	26	10½	12	11½	57	18½	48½	48	6	34½	13
DV-8	65,000	90	34	11/32	7½	2	5	3150	70½	79½	42	28	10½	12	11½	64	21	54½	54¼	7½	41½	14
DV-9	100,000	140	50	7/16	10	2½	8	5420	79	95	54	36	11	12	15	75	23½	66½	59	8½	52½	18
DV-10	150,000	210	102	9/16-5/16	15	2½	10	7000	85	106	60	42	11	12	15½	85	25	72½	63	8¾	58½	18½
DV-11	250,000	350	130	23/32	25	4	12	10500	Furnished on application													

*Size of sharp edge orifice in ⅛-in. plate through which pump maintains 10-in. vacuum.
†Weights of 25 cycle units will be approximately 33⅓% in excess of weights listed.
‡Dimension I: On left hand side of receiver, 19¼ in.; on right hand side of receiver, 14⅞ in.
§DV-0 discharge pressure, 10 lb.
Note: Dimensions are for 20-lb. pumps only. Dimensions of high pressure pumps furnished on application.

Suggested Specification for Vacuum Pump

Install where indicated on plans a Hoffman-Economy Vacuum Pump type.....having a capacity of.....square feet of direct cast iron radiation or equivalent and capable of discharging against a pressure of 20 pounds per square inch (maximum pressure for standard pumps; special pumps furnished for pressures above 20 pounds per square inch) at the pump. The unit shall consist of a double chamber, horizontal, welded steel receiving tank with float switch and strainer installed in lower part. Receiving tank shall be so constructed that water will not overflow in the event of current failure. Unit shall be equipped with adjustable vacuum control. Motor shall be continuous rated 40 degrees for.....volts..... phase.....cycle alternating current (or..... volts direct current) and shall have a speed not in excess of 1750 r.p.m. and shall be direct connected to a horizontal bronze fitted centrifugal pump by a flexible coupling. Entire unit shall be assembled on a cast iron base ready for installation.

Where auxiliary accumulator tank is required add:

Install where indicated with cover flush with floor one....in. x ....in. Cast Iron Auxiliary Accumulator Tank complete with float switch and lift fitting connecting to pump in manner approved by manufacturer.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Information for Installing Hoffman-Economy Return Line Vacuum Pumps

Setting—Unit should be placed on firm foundation, carefully levelled and evenly supported. Alignment of flexible coupling between motor and pump should be checked.

Return Lines—If possible, have return line above inlet connection on accumulator chamber so that condensate will flow to pump by gravity. This allows pump to be operated on float control only in mild weather or when fires are banked. Condensate can be lifted a considerable height, but lifts should be avoided whenever possible.

If operating with float control only, vacuum will be created during pumping operations, but amount of vacuum will be less than when vacuum control is used.

When return mains come back under floor, an auxiliary accumulator tank is installed with top flush with floor and with connections as illustrated below.

When operated with vacuum control, the pump will elevate condensate from lift pockets in return lines.

On all installations a gate valve should be installed in the return line and provision made for drain to sewer.

Equalizer Connection—An outlet with check valve is provided for equalizer connection to steam header. The purpose of this connection is to equalize vacuum in system and accumulator and prevent condensate from remaining in return lines during night operation or other period when no steam pressure is carried.

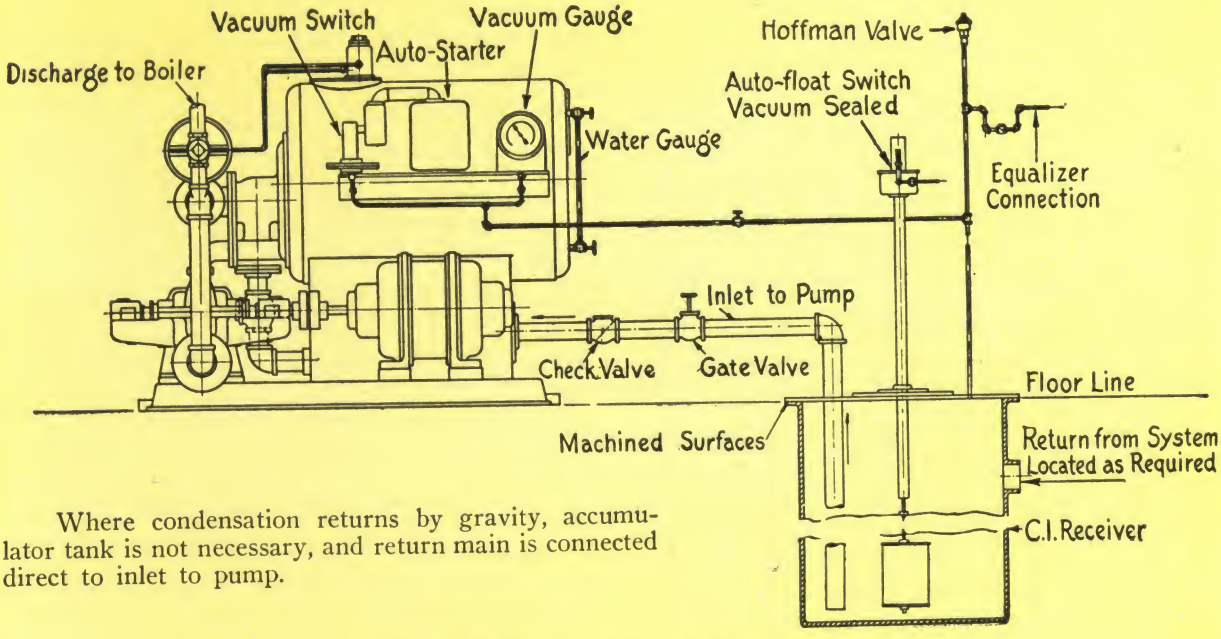
On high pressure or central station jobs, install vent pipe with check valve several feet above return line. Omit connection to header.

Setting of Vacuum Regulators—Vacuum regulators are set at factory to cut in at 3 inches and out at 7 to 8 inches unless otherwise specified. This adjustment may readily be changed after installation.

Information Required with Order

In ordering Hoffman-Economy Return Line Vacuum Pumps, the following information should be furnished.

1. Square feet of direct cast iron radiation or equivalent. (Each foot of Vento, Super-Fin or other blast coil should be figured as the equivalent of 5 to 6 feet of direct radiation).
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.



Where condensation returns by gravity, accumulator tank is not necessary, and return main is connected direct to inlet to pump.

Installation Diagram of Return Line Vacuum Pump

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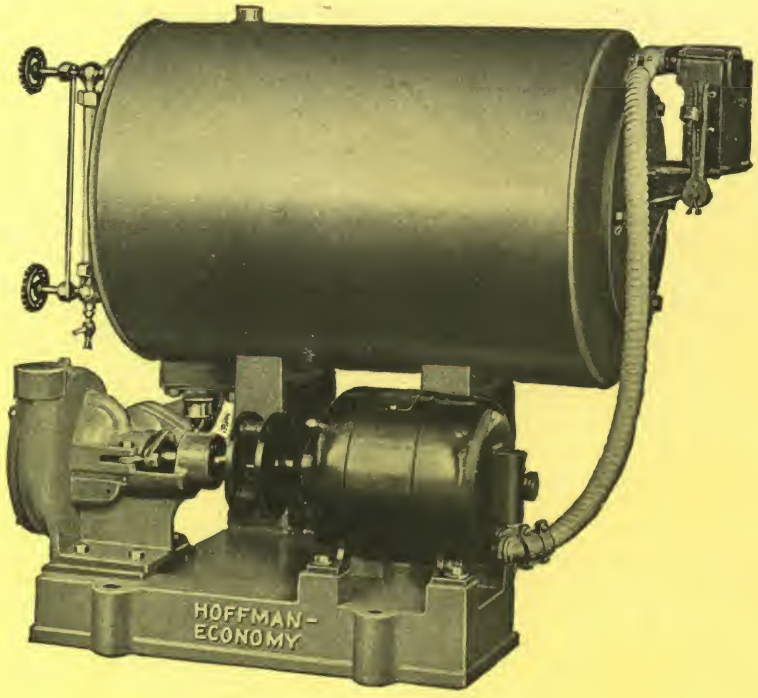
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Horizontal Condensation Pumps and Receivers

Single and Duplex Units

Horizontal condensation pumps and receivers are used on gravity heating systems and are adapted for all kinds of industrial and commercial installations where condensate will drain to the horizontal receiver.

Hoffman-Economy Horizontal Condensation Pumps and Receivers are carefully designed, sturdily constructed and built to give continued high operating efficiency even after years of service.

Automatic float switch assembly is simple and positive. Pumps are bronze fitted throughout and especially adapted for operation at the high temperatures encountered in condensation pump service.

The entire unit, consisting of pump, motor, tank and tank trimmings, is compactly assembled on a single cast iron base having machined pads to insure perfect alignment.

Improved pump performance makes possible the use of comparatively small motors and consequent low consumption of electric power.

Tested and Guaranteed — Every Hoffman-Economy Condensation Pump and Receiver is carefully tested before shipment for capacity, pressure, etc., and a permanent record retained at the factory. Pump is guaranteed for capacity and against defects for a period of one year.

Low Pressure Units—All low pressure units (0 to 20 pounds per square inch) are furnished in Style "A," and with speeds of 1750 or 1440 r.p.m., according to current available.

Medium and High Pressure Units—Medium and high pressure units (35 to 100 pounds per square inch) are made in Style "B," Style "C" and Style "D." (See table of sizes on pages 33 and 35.) Speeds are 1750 r.p.m. and 3500 r.p.m. For apartment houses, office buildings, etc., where extreme quietness of operation is desired, 1750 r.p.m. units should be selected.

Duplex Units—Consisting of two pumps and motors with a single tank and float switch control, mounted on one base can be furnished when desired.

Motors—Standard motors are used on all units, thus permitting easy replacement without waiting for factory shipment. Motors have 40° continuous temperature rating and are liberally selected to provide ample overload capacity.

Single phase motors 1 hp., 110 volts and 1½ hp., 220 volts and larger, are equipped with magnetic contactors with thermal overloads. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release

Continued on next page

HOFFMAN-ECONOMY PUMPS

are used in sizes 2 hp. and larger. Smaller sizes are controlled directly by float switch.

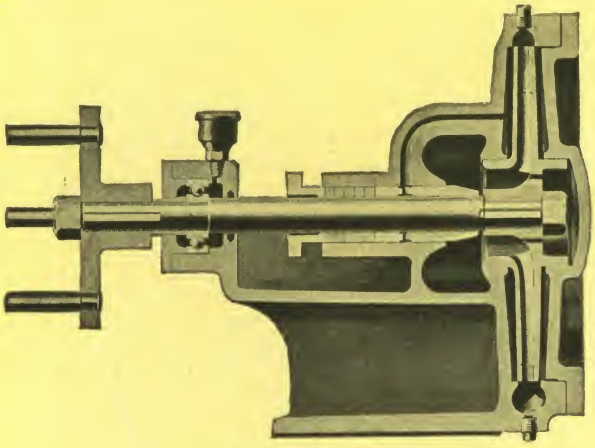
Direct current motors 1 hp. and over have an automatic starter with overload protection. Smaller motors are controlled directly by float switch.

All wiring between automatic controls and motors is carried in flexible metallic conduits.

Pump—All units are equipped with highly efficient, bronze fitted, enclosed impeller centrifugal pumps, especially adapted for operation at the high temperatures encountered in condensation pump service. Pumps have accurately balanced bronze impeller, heavy turned and ground steel shaft and water sealed packing box with bronze gland.

Styles "A," "B" and "C" pumps have vertically split case; Style "D" has horizontally split case.

Style "A" pumps have outboard ball bearing and self-lubricating, renewable bronze stand bearing.



Cross Section of Style "A" Condensation Pump

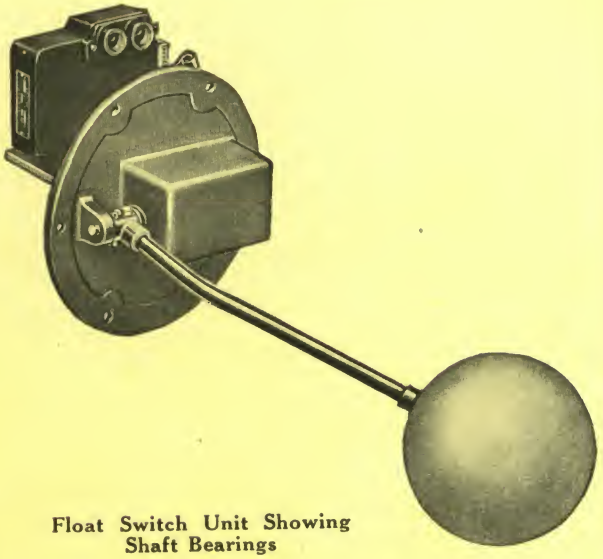
Styles "B" and "C" have double outboard bearings, ring oiling at driving end and ball bearing at opposite end. Both bearings are readily renewable.

Style "D" has double outboard ring oiling bearings; both may easily be renewed if necessary.

Pumps are connected with motor by flexible shaft coupling.

Base Plate—Base plate is of cast iron, heavily ribbed to prevent distortion and to permit bolting to floor without special foundation. Pump and motor are aligned on machined pads and are securely attached to base with cap screws. The cast iron feet on which receiver is mounted are bolted to the base.

Receiver—Receiver is of heavy gauge welded steel securely attached to cast iron feet by anchor bolts welded to the shell. Connection between receiver and pump is arranged to permit expansion.



Float Switch Unit Showing Shaft Bearings

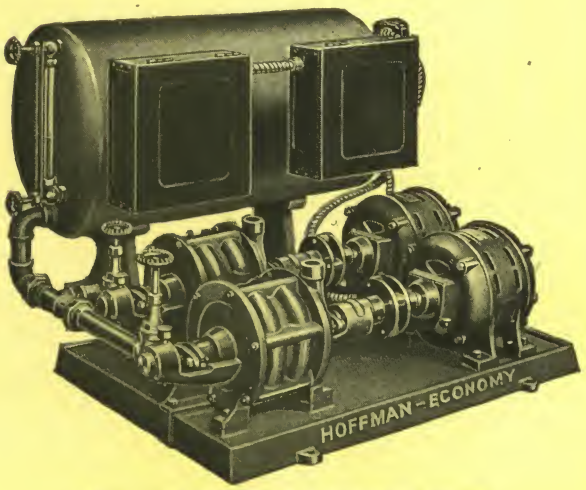
Cast iron receivers can be furnished, if desired, at slight additional cost; but because of lighter weight, standard steel receivers are recommended.

Float Switch Mechanism—Float switch is positive and dependable in starting the motor when condensation collects in receiver. Mechanism can be removed as a unit and is easily adjustable to individual conditions.

Bronze float shaft is firmly supported by two liberal bearings, reducing danger of sticking or binding.

Float switch and operating mechanism are mounted on a cast iron tank head attached to receiver. Float is made of seamless copper tested under high pressure.

The switch itself is an especially constructed spring loaded type, having wiping contacts with double break, designed to prevent arcing.



Standard Duplex Condensation Pump

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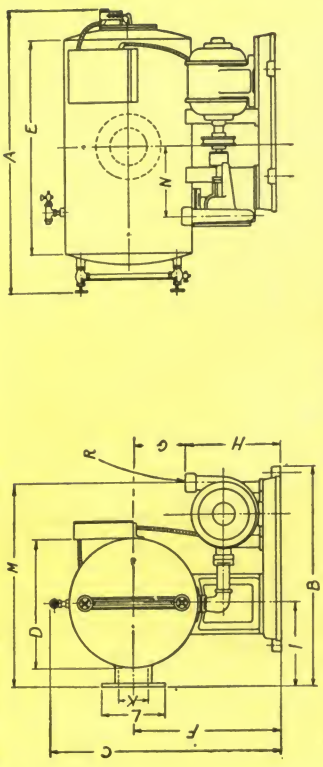
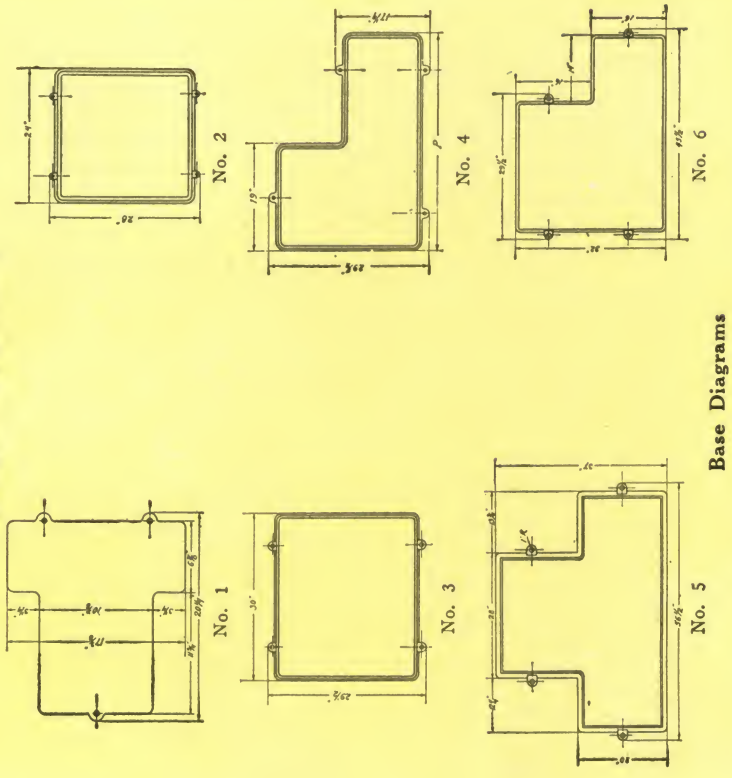
HOFFMAN-ECONOMY PUMPS

DIMENSION DIAGRAMS

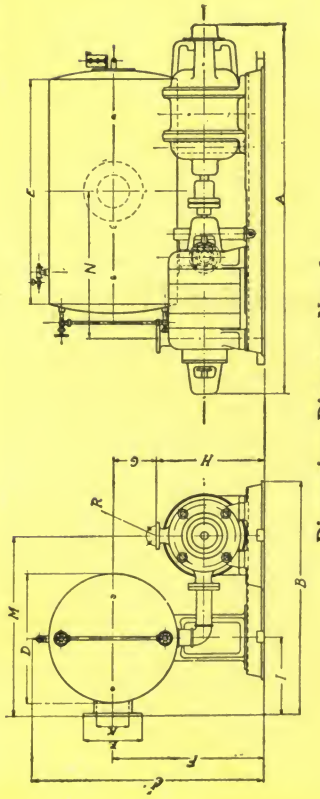
Condensation Pumps Equipped with 110-220-440 Volt—60 Cycle—Single or Polyphase Motors and 110-220 Volt Direct Current Motors



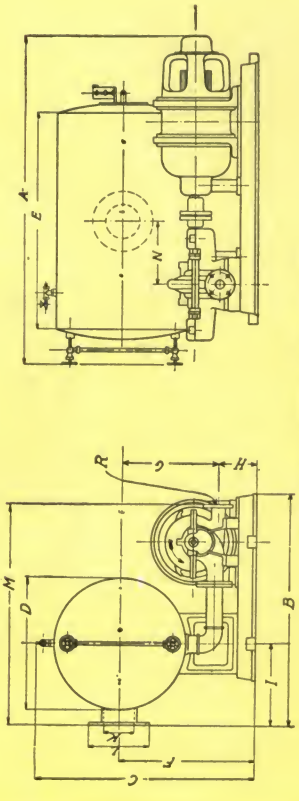
Dimension Diagram No. 4



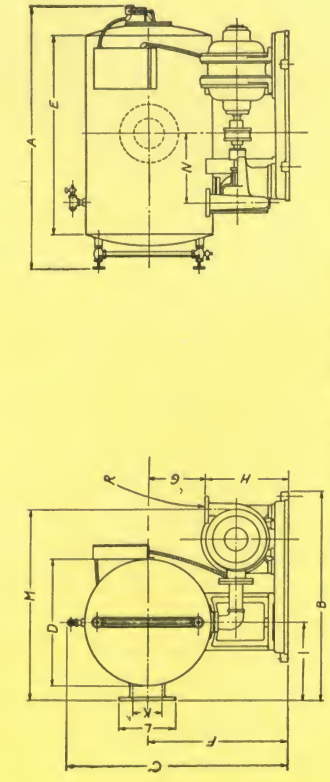
Base Diagrams



Dimension Diagram No. 1



Dimension Diagram No. 2



Dimension Diagram No. 3

Continued on next page

HOFFMAN-ECONOMY PUMPS

CAPACITIES AND DIMENSIONS
CONDENSATION PUMPS EQUIPPED WITH 110-220-440 VOLT—60 CYCLE—SINGLE OR POLYPHASE MOTORS AND DIRECT CURRENT MOTORS

Pump and Style No.	Capacity, sq. ft. direct c. rad. or equiv.	Capacity, lbs. condensate per hr.*	Discharge pressure, lbs. per sq. in.	Pump capacity, g. p. m.*	Motor hp.	Capacity receiver, gal.	Speed, r.p.m.	Approximate shipping weight, lb.	Dimensions—These dimensions are approximate. Not to be used for construction																		
									Dimension diagr'm	Base diagr'm	A	B	C	D	E	F	G	H	I	K	L	M	N	P	R	No. stages
10A	1,000	250	10	2	¼	10	1,750	250	Fig. 3	Fig. 1	30	25	27	14	18	15½	5¼	10¼	9	2	Cplg.	23⅝	8½	.....	1	1
30A	3,000	750	10	5	¼	13	1,750	250	3	1	32	25½	27	14	20	16	5¾	10¼	9½	2	Cplg.	24⅛	8½	.....	1	1
31A	3,000	750	15	5	½	13	1,750	340	3	2	31	29½	29½	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
32A	3,000	750	20	5	¾	13	1,750	430	3	2	31	29½	29½	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
60A	6,000	1,500	10	12	¼	20	1,750	275	3	1	42	25½	27	14	30	16	5¾	10¼	9½	3	Cplg.	24⅛	8½	.....	1	1
61A	6,000	1,500	15	12	½	20	1,750	360	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
62A	6,000	1,500	20	12	¾	20	1,750	450	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
64B	6,000	1,500	30	12	1	20	1,750	550	4	4	45	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	3	35	1	2
65B	6,000	1,500	40	12	1½	20	1,750	650	4	4	51	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	¼	40½	1	3
65C	6,000	1,500	40	12	1½	20	3,500	525	4	4	42	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	5¾	35	1	1
66B	6,000	1,500	50	12	2	20	1,750	650	4	4	52	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	¼	40½	1	3
66C	6,000	1,500	50	12	2	20	3,500	550	4	4	44	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	5¾	35	1	1
67B	6,000	1,500	60	12	3	20	1,750	750	4	4	57	31	30	14	30	19¾	4¼	15½	9½	3	Cplg.	24½	2½	40½	1	4
67C	6,000	1,500	60	12	3	20	3,500	600	4	4	45	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	5¾	35	1	1
68C	6,000	1,500	75	12	3	20	3,500	650	4	4	48	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	3	35	1	2
69C	6,000	1,500	100	12	5	20	3,500	700	4	4	51	31	30	14	30	19¾	4¼	15½	9½	3	Cplg.	24½	3	35	1	2
100A	10,000	2,500	10	20	¼	26	1,750	290	3	1	42	26½	29	16	30	17	6¾	10¼	10½	3½	8½	25⅛	8½	.....	1	1
101A	10,000	2,500	15	20	½	26	1,750	375	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
102A	10,000	2,500	20	20	¾	26	1,750	475	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
103B	10,000	2,500	25	20	1	26	1,750	625	4	4	45	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	3	35	1	2
104B	10,000	2,500	30	20	1½	26	1,750	650	4	4	48	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	3	35	1	2
105B	10,000	2,500	40	20	1½	26	1,750	675	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
105C	10,000	2,500	40	20	1½	26	3,500	550	4	4	42	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	5¾	35	1	1
106B	10,000	2,500	50	20	2	26	1,750	700	4	4	52	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
106C	10,000	2,500	50	20	2	26	3,500	600	4	4	44	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	5¾	35	1	1
107B	10,000	2,500	60	20	3	26	1,750	775	4	4	57	32	33	16	30	20¾	5¼	15½	10½	3½	8½	25½	2½	40½	1	4
107C	10,000	2,500	60	20	3	26	3,500	650	4	4	45	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	5¾	35	1	1
109C	10,000	2,500	100	20	5	26	3,500	750	4	4	51	32	33	16	30	20¾	5¼	15½	10½	3½	8½	25½	3	35	1	2
151A	15,000	3,750	15	30	½	33	1,750	400	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
152A	15,000	3,750	20	30	¾	33	1,750	525	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
153B	15,000	3,750	25	30	1	33	1,750	675	4	4	45	33	35	18	30	21¾	7½	14¼	11½	4	9	26½	3½	35	1	2
155B	15,000	3,750	30	30	2	33	1,750	750	4	4	52	33	35	18	30	21¾	7	14¾	11½	4	9	26½	¾	40½	1	3
155C	15,000	3,750	40	30	2	33	3,500	650	4	4	44	33	35	18	30	21¾	7	14¾	11½	4	9	26½	6¼	35	1	1
157B	15,000	3,750	60	30	3	33	1,750	825	4	4	57	33	35	18	30	21¾	6¼	15½	11½	4	9	26½	2	40½	1	4
157C	15,000	3,750	60	30	3	33	3,500	700	4	4	48	33	35	18	30	21¾	7	14¾	11½	4	9	26½	3½	35	1	2
159C	15,000	3,750	100	30	5	33	3,500	775	4	4	51	33	35	18	30	21¾	6¼	15½	11¼	4	9	26½	3½	35	1	2
200A	20,000	5,000	10	40	½	41	1,750	425	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
201A	20,000	5,000	15	40	¾	41	1,750	450	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
202A	20,000	5,000	20	40	1	41	1,750	550	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
203B	20,000	5,000	25	40	1½	41	1,750	675	4	4	48	34	37	20	30	22¾	8	14¾	12½	4	9	27½	3½	35	1	2
205B	20,000	5,000	40	40	2	41	1,750	750	4	4	52	34	37	20	30	22¾	8	14¾	12½	4	9	27½	¾	40½	1	3
205C	20,000	5,000	40	40	2	41	3,500	650	4	4	44	34	37	20	30	22¾	8	14¾	12½	4	9	27½	6¼	35	1	1
207B	20,000	5,000	60	40	3	41	1,750	625	4	4	57	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	2	40½	1	4
207C	20,000	5,000	60	40	3	41	3,500	700	4	4	48	34	37	20	30	22¾	8	14¾	12½	4	9	27½	3½	35	1	2
209C	20,000	5,000	100	40	5	41	3,500	775	4	4	52	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	¾	40½	1	3
300A	30,000	7,550	10	53	½	49	1,750	500	3	2	48	32½	37½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
301A	30,000	7,550	15	53	¾	49	1,750	525	3	2	48	32½	36½	20	36	24¼	11⅜	13⅛	12½	5	10	29½	12	.....	1½	1
302A	30,000	7,550	20	53	1	49	1,750	630	3	2	48	32½	36½	20	36	24¼	11⅜	13⅛	12½	5	10	29½	12	.....	1½	1
303A	30,000	7,550	25	53	1½	49	1,750	725	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2" Flg.	1
304A	30,000	7,550	30	53	2	49	1,750	760	4	3	46	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2" Flg.	1
307C	30,000	7,550	60	53	5	49	3,500	1,150	2	6	52	37⅛	36¾	20	36	23¾	17⅜	6⅜	12¼	5	10	36½	10½	.....	1½ Flg.	1
308C	30,000	7,550	75	53	7½	49	1,750	1,260	1	5	60	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	1½ Flg.	3
309B	30,000	7,550	100	53	10	49	1,750	1,550	1	5	63	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	1½ Flg.	3
400A	40,000	10,000	10	80	1	59	1,750	725	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
402A	40,000	10,000	20	80	1½	59	1,750	750	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
403A	40,000	10,000	25	80	2	59	1,750	800	4	3	46	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
404A	40,000	10,000	30	80	3	59	1,750	850	4	3	48	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2" Flg.	1
407D	40,000	10,000	60	80	5	59	3,500	1,400	2	6	52	38½	3 ⁷⁄₈	22	36	24¾	18⅜	6⅜	13½	5	10	37½	10½	.....	1½ Flg.	1
408D	40,000	10,000	75	80	7½	59	3,500	1,400	2	6	55	38½	38¾	22	36	24¾	18⅜	6⅜	13½	5	10	37½	10½	.....	1½ Flg.	3
409B	40,000	10,000	100	80	10	59	1,750	1,550	1	5	63	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	20¼	.....	1½ Flg.	3
700A	70,000	17,500	10	135	2	82	1,750	900	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2" Flg.	1
703A	70,000	17,500	25	135	3	82	1,750	1,000	4	3	49	36	40	24	42	24¼	10	14¼	14½	6	11	32⅛	14¼	.....	2" Flg.	1
705D	70,000	17,500	40	135	7½	82	1,750	1,300	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2" Flg.	1
708D	70,000	17,500	75	135	10	82	3,500	1,400	2	6	63	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	22¼	.....	1½ Flg.	3
709B	70,000	17,500	100	135	10	82	1,750	2,100	1	5	67	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	25	.....	1½ Flg.	4

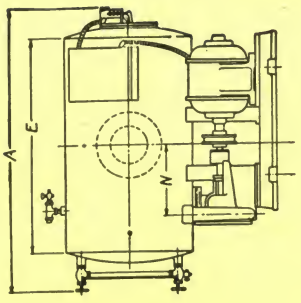
*As an indication of the conservative rating of Hoffman-Economy Pumps—the capacity under continuous operation is four times that given in table.
Where extreme quietness of operation is required select pumps of 1750 r.p.m. instead of 3500 r.p.m. motor speed.

Continued on next page

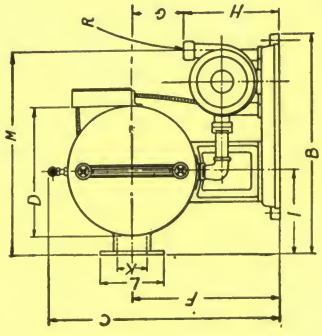
HOFFMAN-ECONOMY PUMPS

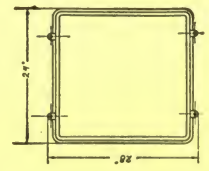
DIMENSION DIAGRAMS

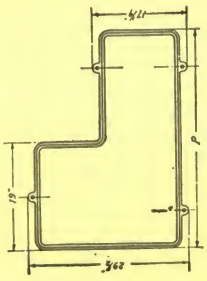
Condensation Pumps Equipped with 110-220-440 Volt, 25 or 50 Cycle, Single or Polyphase Motors

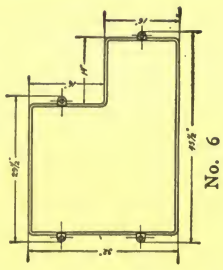


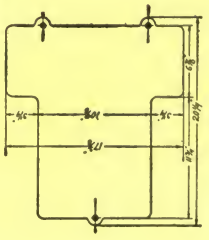
Dimension Diagram No. 4

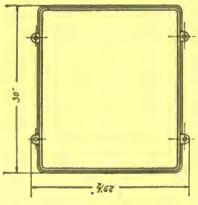


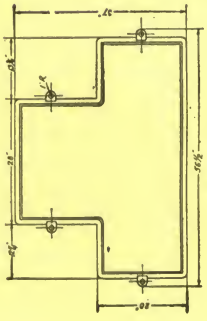




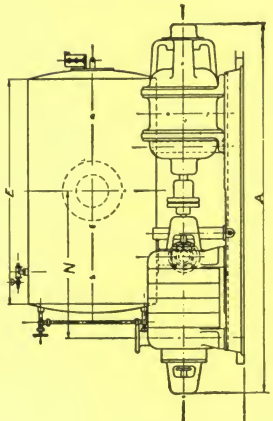


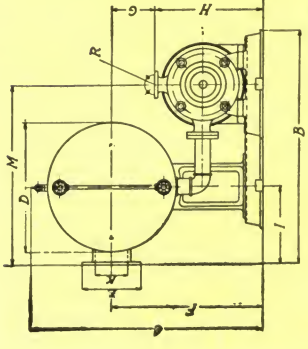




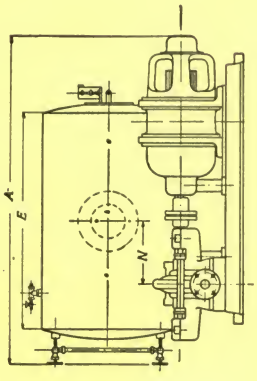


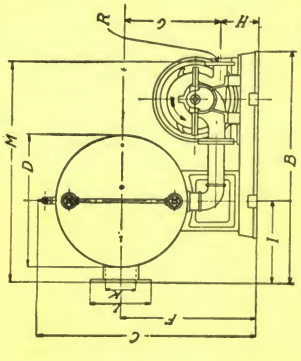
Base Diagrams



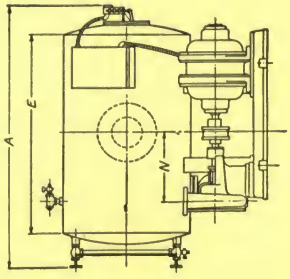


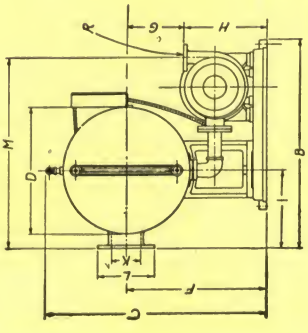
Dimension Diagram No. 1





Dimension Diagram No. 2





Dimension Diagram No. 3

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HOFFMAN-ECONOMY PUMPS

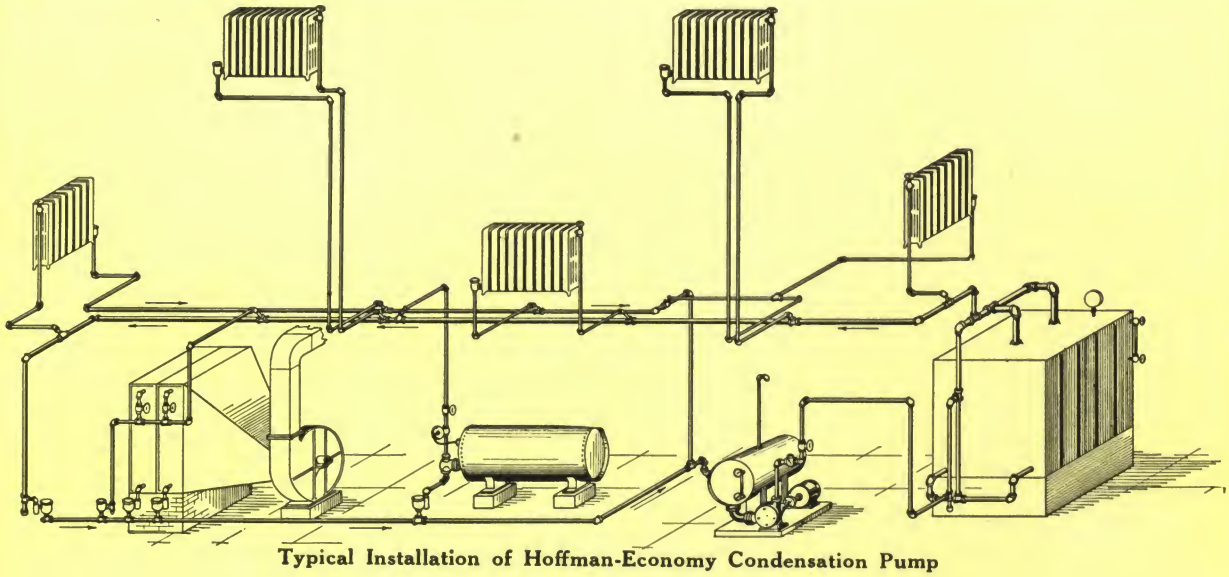
CAPACITIES AND DIMENSIONS
CONDENSATION PUMPS EQUIPPED WITH 110-220-440 VOLT—25 OR 50 CYCLE—SINGLE OR POLYPHASE MOTORS

Pump and Style No.	Capacity, sq. ft. i. direct c. i. rad. or equiv.	Capacity, lbs. condensate per hr.*	Discharge pressure, lbs. per sq. in.	Pump capacity, g. p. m.*	Motor hp.†	Capacity receiver, gal.	Speed, r.p.m.	Approximate shipping weight, lb.	Dimensions—These dimensions are approximate. Not to be used for construction																	
									Dimension diagr'm	Base diagr'm	A	B	C	D	E	F	G	H	I	K	L	M	N	P	R	No. stages
10A	1,000	250	10	2	¼	10	1,450	330	Fig. 3	Fig. 2	30	28½	28¾	13	18	18¾	5⅝	13⅛	9	2	Cplg.	26	9¼	.....	1½	1
30A	3,000	750	10	5	¼	13	1,450	330	3	2	31	29½	29¼	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
31A	3,000	750	15	5	½	13	1,450	450	3	2	31	29½	29¼	14	20	19¼	6⅛	13⅛	9½	2	Cplg.	26½	9¼	.....	1½	1
32A	3,000	750	20	5	¾	13	1,450	570	4	4	41	28	30	14	20	18	5	13	9½	2	Cplg.	24¼	2½	35	1'	2
60A	6,000	1,500	10	12	¼	20	1,450	365	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
61A	6,000	1,500	15	12	½	20	1,450	480	3	2	41	29½	29½	14	30	19¼	6⅛	13⅛	9½	3	Cplg.	26½	9¼	.....	1½	1
62A	6,000	1,500	20	12	¾	20	1,450	600	4	4	45	31	30	14	30	19¾	5½	14¼	9½	3	Cplg.	24½	3	35	1'	2
64B	6,000	1,500	30	12	1	20	1,450	730	4	4	51	31	30	14	30	19¾	5	14¾	9½	3	Cplg.	24½	¼	40½	1'	3
65B	6,000	1,500	40	12	1½	20	1,450	865	4	4	57	31	30	14	30	19¾	4¼	15½	9½	3	Cplg.	24½	2½	40½	1	4
66B	6,000	1,500	50	12	2	20	1,450	865	4	4	63	32	34	14	30	21½	5½	16	9½	3	Cplg.	25½	5½	50	1	5
67B	6,000	1,500	60	12	3	20	1,450	1,000	4	4	68	32	35	14	30	22½	5½	17	9½	3	Cplg.	25½	8¼	50	1	6
100A	10,000	2,500	10	20	¼	26	1,450	385	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
101A	10,000	2,500	15	20	½	26	1,450	500	3	2	41	30½	32½	16	30	20¼	7⅛	13⅛	10½	3½	8½	27½	9¼	.....	1½	1
102A	10,000	2,500	20	20	¾	26	1,450	630	4	4	45	32	33	16	30	20¾	6½	14¼	10½	3½	8½	25½	3	35	1	2
103B	10,000	2,500	25	20	1	26	1,450	830	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
104B	10,000	2,500	30	20	1½	26	1,450	865	4	4	51	32	33	16	30	20¾	6	14¾	10½	3½	8½	25½	¼	40½	1	3
105B	10,000	2,500	40	20	1½	26	1,450	900	4	4	57	32	33	16	30	20¾	5¼	15½	10½	3½	8½	25½	2½	40½	1	4
106B	10,000	2,500	50	20	2	26	1,450	930	4	4	63	33	35	16	30	22½	6½	16	10½	3½	8½	26½	5½	50	1	5
107B	10,000	2,500	60	20	3	26	1,450	1,030	4	4	68	33	36	16	30	23½	6½	17	10½	3½	8½	25½	8¼	50	1	6
151A	15,000	3,750	15	30	½	33	1,450	530	3	2	41	31½	34½	18	30	21¼	8⅛	13⅛	11½	4	9	28½	9¾	.....	1½	1
152A	15,000	3,750	20	30	¾	33	1,450	700	4	3	44	33	36	18	30	21¾	6¾	14½	11½	4	9	29¼	10	30	2 Fig.	1
153B	15,000	3,750	25	30	1	33	1,450	900	4	4	52	33	35	18	30	21¾	7	14¾	11½	4	9	26½	¾	40½	1	3
155B	15,000	3,750	40	30	2	33	1,450	1,000	4	4	57	33	35	18	30	21¾	6¼	15½	11½	4	9	25½	2	40½	1	4
157B	15,000	3,750	60	30	3	33	1,450	1,100	4	4	68	34	37	18	30	24½	7½	17	11½	4	9	27½	7¾	50	1	6
200A	20,000	5,000	10	40	½	41	1,450	565	3	2	41	32½	36½	20	30	24¼	11⅛	13⅛	12½	4	9	29½	9¾	.....	1½	1
201A	20,000	5,000	15	40	¾	41	1,450	600	4	3	45	33	36	20	30	22¼	8	14¼	12½	4	9	30⅛	10	.....	2 Fig.	1
202A	20,000	5,000	20	40	1	41	1,450	730	4	3	45	34	36	20	30	22¼	8	14¼	12½	4	9	30⅛	10	.....	2 Fig.	1
203B	20,000	5,000	25	40	1½	41	1,450	900	4	4	52	34	37	20	30	22¾	8	14¾	12½	4	9	27½	¾	40½	1	3
205B	20,000	5,000	40	40	2	41	1,450	1,000	4	4	57	34	37	20	30	22¾	7¼	15½	12½	4	9	27½	2	40½	1	4
207B	20,000	5,000	60	40	3	41	1,450	830	4	4	68	35	38	20	30	24½	7½	17	12½	4	9	28½	7¾	50	1	6
208B	20,000	5,000	75	40	5	41	1,450	1,600	1	5	68	41½	39	20	30	26	5¾	20¼	12½	4	9	31½	20¾	.....	1½ Flg.	4
209C	20,000	5,000	100	40	5	41	1,450	1,030	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	25¾	.....	1½ Fig.	5
300A	30,000	7,550	10	53	½	49	1,450	665	3	2	48	32½	37½	20	36	24¼	11⅛	13⅛	12½	5	10	29½	12	.....	1½	1
301A	30,000	7,550	15	53	¾	49	1,450	700	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2 Flg.	1
302A	30,000	7,550	20	53	1	49	1,450	835	4	3	45	34	36	20	36	22¼	8	14¼	12½	5	10	30⅛	12¼	.....	2 Flg.	1
303A	30,000	7,550	25	53	1½	49	1,450	970	1	5	52	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	17½	.....	1½ Flg.	2
304A	30,000	7,550	30	53	2	49	1,450	1,010	1	5	57	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	17½	.....	1½ Flg.	2
306B	30,000	7,550	50	53	3	49	1,450	1,860	1	5	65	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	20¼	.....	1½ Flg.	3
308C	30,000	7,550	75	53	7½	49	1,450	1,680	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	23	.....	1½ Flg.	4
309B	30,000	7,550	100	53	10	49	1,450	2,060	1	5	68	41½	39	20	36	26	5¾	20¼	12½	5	10	31½	25¾	.....	1½ Flg.	5
400A	40,000	10,000	10	80	1	59	1,450	965	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2 Flg.	1
402A	40,000	10,000	20	80	1½	59	1,450	1,000	4	3	45	35	38	22	36	23¼	9	14¼	13½	5	10	31⅛	12¼	.....	2 Flg.	1
403A	40,000	10,000	25	80	2	59	1,450	1,060	1	5	58	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	17½	.....	1½ Flg.	2
404A	40,000	10,000	30	80	3	59	1,450	1,130	1	5	58	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	17½	.....	1½ Flg.	2
407D	40,000	10,000	60	80	5	59	1,450	1,860	1	5	65	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	20¼	.....	1½ Flg.	3
408D	40,000	10,000	75	80	7½	59	1,450	1,860	1	5	66	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	23	.....	1½ Flg.	4
409B	40,000	10,000	100	80	10	59	1,450	2,060	1	5	69	42½	41	22	36	27	6¾	20¼	13½	5	10	32½	25¾	.....	1½ Flg.	5
700A	70,000	17,500	10	135	2	82	1,450	1,200	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
701A	70,000	17,500	15	135	2	82	1,450	1,860	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
703A	70,000	17,500	25	135	3	82	1,450	1,335	2	6	60	40⅛	39½	24	42	24½	16¼	8¼	14½	6	11	.....	12½	.....	2 Flg.	1
705D	70,000	17,500	40	135	7½	82	1,450	1,730	1	5	65	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	25	.....	1½ Flg.	3
708D	70,000	17,500	75	135	10	82	1,450	1,860	2	6	69	43½	43	24	42	28	7¾	20¼	14½	6	11	33½	27¾	.....	1½ Flg.	5

*As an indication of the conservative rating of Hoffman-Economy Pumps—the capacity under continuous operation is four times that given in table.
†Horsepower of 25-cycle motors may vary somewhat from those shown in table.

Continued on next page

HOFFMAN-ECONOMY PUMPS



Typical Installation of Hoffman-Economy Condensation Pump

Information for Installing Hoffman-Economy Horizontal Condensation Pumps

Horizontal condensation pumps and receivers are suitable for use where the radiation is 12 to 18 inches above the floor or foundation upon which the pump is set. If the pump is installed in a pit, proper provision must be made for drainage and ventilation, as it is essential to keep the motor absolutely dry. Vertical underground pumps should be used for draining radiation close to or below the floor level. (See pages 38 and 39.)

All condensation pumps and receivers must be selected to discharge against the pressure at which safety valve is set, plus allowance necessary to overcome pipe friction and difference in level between boiler water line and pump. Unless the pump is capable of discharging against this maximum pressure, there is danger that it will fail to return water to the boiler if the pressure exceeds normal. Hoffman-Economy pumps will discharge against a pressure of at least three pounds over their rating.

All receivers are vented to the atmosphere, and unless especially ordered, are not designed for internal pressures. No responsibility will be assumed by the company if receiver vents are closed for any reason.

If radiators are not equipped with individual traps, it will be necessary to install a trap at inlet of receiver to prevent steam entering receiver and interfering with the pump action. Traps are not regularly furnished with pumps.

High water alarm, bell and batteries can be furnished with any pump at an extra charge.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent. (Each foot of Vento, Super-Fin or other blast coil is considered equivalent to 5 or 6 feet of direct radiation.)
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.

All Hoffman-Economy Pump and Receivers are shipped with pump, motor and automatic control completely assembled. After making necessary electrical connections and provision to prevent steam entering pump, the unit is ready to run.

Suggested Specification for Horizontal Condensation Pump

Install where indicated on plans one size..... Hoffman-Economy Horizontal Condensation Pump and Receiver suitable for.....square feet direct cast iron radiation or equivalent and capable of operating against a pressure of.....pounds per square inch at the pump. Pump shall be of the centrifugal type, with enclosed bronze impeller and so constructed that access may be had to impeller and other interior parts without breaking pipe connections. Shaft shall be run in two renewable bronze bearings, one of which shall be of the ball type. Motor shall be continuous rated 40 degrees and shall be suitable for....volts.... phase.....cycles alternating current (or..... volts direct current) and shall be direct connected to pump by a flexible coupling. Operation of motor shall be controlled by an automatic float switch installed in receiver. All parts shall be assembled on a cast iron base ready for installation.

Continued on next page

HOFFMAN-ECONOMY PUMPS

Hoffman-Economy Reciprocating Pumps and Receivers

The Hoffman-Economy Reciprocating Pump and Receiver is a dependable unit for use in laundries, cleaning and dyeing plants, greenhouses and other industrial establishments where it is necessary to carry pressure from 50 to 100 pounds and where moderate priced equipment is required.

Reciprocating pumps operate on less power than the centrifugal type, but are not as quiet, due to the slight pulsation at the end of each stroke and the hum from the chain drive. Ordinarily, this is not objectionable, but where extreme quietness is desired, Style "B," "C" or "D" 1750 r.p.m. pumps should be used. (Pg. 30.)

Reciprocating pumps are frequently used on remodeled jobs in which various types of systems have been supplied from the same boiler. In such installations the pump handles the condensate from the entire job and also establishes a low vacuum on the return mains. This vacuum is not capable of control, being incidental to the operation of the unit as a condensation pump. Vacuum may be controlled by manually operated valves.

Construction Details

Pump—Is self-oiling enclosed type with bronze lined cylinders, bronze valve seats and piston rod. It has Timken bearings; cast steel crank shaft driven through accurately cut gears; silent chain drive from pump to motor. *Receiver and Automatic Float Control* are same as used in centrifugal pumps.

Motors—Are standard make, 40° rise continuous duty, 1750 r.p.m. They are ample to start pump under any load and to operate without overheating.

Single phase motors 1 hp., 110 volts and larger are equipped with magnetic contactors with thermal overload. Smaller motors are controlled directly from float switch.

Polyphase motors of all sizes are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release are used in 2 hp. size. Smaller sizes are controlled directly from float switch.

Direct current motors 1 hp. and over are equipped with automatic starter having overload protection. Smaller motors are controlled directly by float switch.

Information for Installing

Units are shipped complete with pump, motor, automatic control and receiver with trimmings, all mounted on cast iron base, ready for installation.

It is unsafe to install a gate valve in the discharge line as these pumps are positive. A check valve only should be used.

Information Required with Order

Same as for Horizontal Condensation Pump. See page 36.

STANDARD SIZES

Pump No.	Capacity, sq. ft. direct radiation or equiv.	Capacity, lbs. condensate per hr.	Discharge pressure lbs. per sq. in.	Pump cap. g.p.m.	Motor hp.	Receiver capacity, gal.	Approx. shipping weight, lb.
R- 11	1,000	250	50	2	½	9	500
R- 12	1,000	250	100	2	¾	9	600
R- 31	3,000	750	50	5	½	13	575
R- 32	3,000	750	100	5	¾	13	625
R- 61	6,000	1,500	50	10	½	20	700
R- 62	6,000	1,500	100	10	1	20	725
R-101	10,000	2,500	50	16	1	26	900
R-102	10,000	2,500	100	16	2	26	950

Continued on next page

HOFFMAN-ECONOMY PUMPS

Hoffman-Economy Vertical Underground Pumps and Receivers

Hoffman-Economy Vertical Underground Pumps and Receivers are used where returns are located below floor level or otherwise too low for horizontal pumps. To save floor space, they may be installed flush with floor so as to occupy only space enough for the motor and control.

Duplex Units—Two pumps with individual motors may be installed in a single tank of larger size if desired.

High Pressure Units—Where it is necessary to use underground pumps on high pressure jobs, a horizontal booster pump is furnished. Information furnished on request.

Construction Details

Pump—Pump is a special vertical centrifugal pump with enclosed bronze impeller of the non-overloading type, machined all over and balanced.

Pump shaft is ball bearing, mounted in dust-proof housing. Lower bearing is self-lubricating and easily renewable without removing impeller from shaft or dismantling pump. Shaft is protected in lower bearing from wear by renewable sleeve, turned, ground and locked to shaft.

Flexible shaft coupling connects pump and motor.

Base—Both pump and motor are mounted on base plate, permitting removal of pump without disturbing receiver cover. Motor is aligned by means of shoulder and recess.

Receiver—Receiver is of heavy cast iron suitable for underground use without danger of corrosion.

Float Control Mechanism—Float switch is of same design as used in horizontal pumps. Float is removable without disturbing pumps.

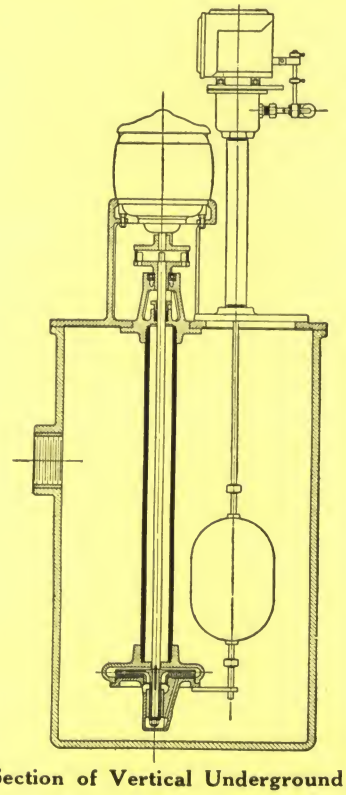
Motors—Motors are standard make, continuous rated 40 degrees, 1750 r.p.m.

Single phase 1 hp., 110 volts and 1½ hp., 220 volt motors are equipped with automatic starters having thermal overloads. Smaller motors are controlled directly from float switch.

All polyphase motors are equipped with thermal overload cutouts. Magnetic contactors with overload and no voltage release are used in 2 hp. sizes and larger. Smaller sizes are controlled directly by float switch.

Direct current motors 1 hp. and over have automatic starters with overload protection. Smaller motors are controlled directly by float switch.

Vertical Underground Unit



Cross Section of Vertical Underground Pump

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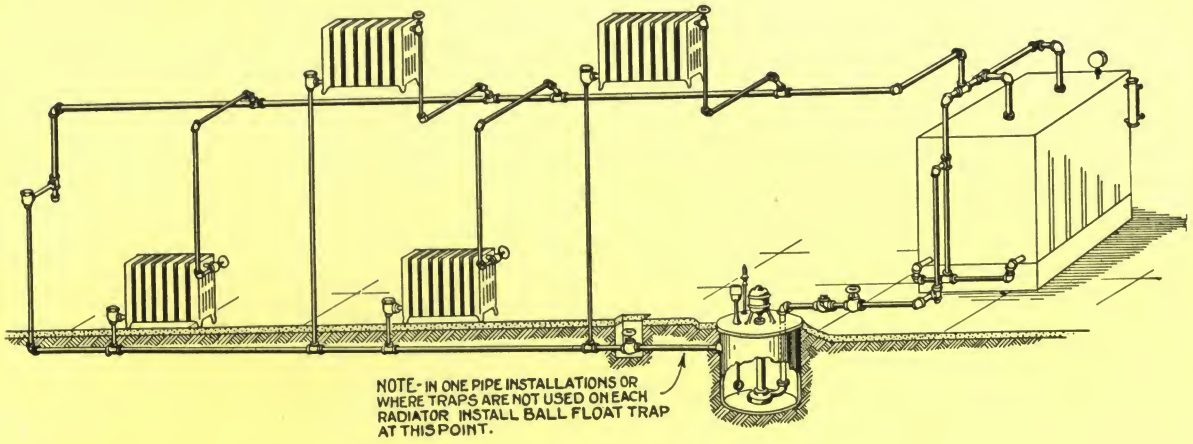
HOFFMAN-ECONOMY PUMPS



Typical Installation of Underground Unit

Information for Installing

Units are shipped with cast iron tank with one inlet, vertical pump and motor with full automatic control, completely wired.

Standard tanks have single inlet with center located 9 inches below top cover. Other location of tapping may be obtained without extra charge; additional inlets will be furnished at slight extra cost.

In installing unit, if radiators are not equipped with individual traps, a float trap should be installed in return main at receiver to prevent entrance of steam.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent.
2. Electric current available.
3. Boiler pressure—safety valve setting.
4. Difference in elevation between pump and boiler water line with size and length of intervening piping.
5. Distance from floor to center of return main.

Vertical Underground Pumps and Receivers

STANDARD SIZES

Pump No.	Diameter inlet conn., in.	Diameter outlet conn., in.	Hgt. above floor, in.	Capacity, sq. ft. direct c.i.rad. or equiv.	Capacity, lb. condensate per hr.	Discharge pressure, lb. per sq. in.	Pump cap. g.p.m.	Motor hp.	Receiver dimensions, in.	Approx. shipping weight, lb.
U- 30	3	1¼	24	3,000	750	10	6	¼	16 x 30	445
U- 31	3	1¼	44			15		½	20 x 30	750
U- 32	3	1¼	44			20		¾	20 x 30	780
U- 50	3	1¼	24	5,000	1,250	10	10	¼	16 x 30	445
U- 51	3	1¼	44			15		½	20 x 30	750
U- 52	3	1¼	44			20		¾	20 x 30	780
U- 80	3	1¼	24	8,000	2,000	10	16	¼	18 x 30	490
U- 81	3	1¼	44			15		½	20 x 30	750
U- 82	3	1¼	44			20		¾	20 x 30	780
U-120	4	1½	44	12,000	3,000	10	24	½	24 x 36	960
U-122	4	1½	44			20		¾	24 x 36	990
U-200	4	1½	44	20,000	5,000	10	40	½	24 x 36	960
U-201	4	1½	44			15		¾	24 x 36	990
U-202	4	1½	44			20		1	24 x 36	1,080
U-300	5	2	44	30,000	7,500	10	60	1	30 x 36	1,200
U-301	5	2	44			15		1½	30 x 36	1,290
U-302	5	2	44			20		2	30 x 36	1,330

All 25-cycle units operate at 1450 r.p.m. Weights will be approximately one-third greater than shown. Receivers furnished with 25-cycle units may be larger than shown in table.

Suggested Specification for Vertical Underground Pump

Install where indicated on plans a Hoffman-Economy Underground Condensation Pump and Cast Iron Receiver No.....complete with vertical bronze fitted centrifugal pump suspended from receiver cover. Pump shall be so constructed that bearings may be renewed without removing impeller from shaft or shaft from pump. Shaft shall be protected from bearing wear by a removable sleeve. Receiver shall be equipped with an automatic float switch for controlling motor and shall be removable without disturbing pump or pipe connections. Pump shall be directly connected to motor by a flexible shaft coupling. Motor shall be 40 degree continuously rated, and shall be suitable for..... volts..... cycle.....phase alternating current (or.....volts direct current) and shall be mounted on a machined tripod cast integral with pump base.

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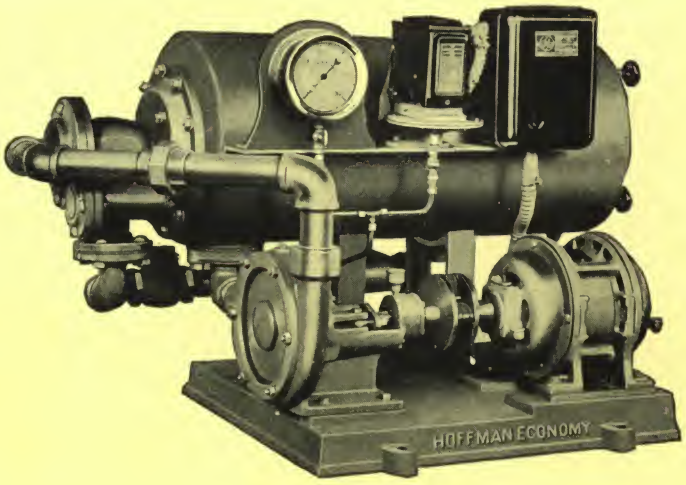
HOFFMAN-ECONOMY PUMPS



Hoffman-Economy Air Line Vacuum Pumps

The Hoffman-Economy Air Line Vacuum Pump is a highly efficient unit for the removal of air from gravity heating installations such as "Paul" or other systems equipped with air line valves. The pump removes air only and does not handle condensate nor act as a boiler feed pump.

Construction Details

Pump—Sizes AL-1 to AL-4 are equipped with single suction, enclosed impellers, bronze fitted centrifugal pumps with outboard ball bearings.

Sizes AL-5 to AL-9 are equipped with double suction, horizontal split case, bronze fitted centrifugal pumps.

All pumps have removable cover which gives access to all working parts without breaking pipe connections.

Jet Vacuum Producer—Jet type vacuum producer is of same design as used in Hoffman-Economy Return Line Vacuum Pumps. (See page 25.)

Tank and Base—Tank is of heavy gauge welded steel and both tank and motor are rigidly bolted to cast iron base with machined pads to insure accurate alignment of unit.

Piping between tank, vacuum producer and pump is completely assembled at factory and unit is shipped wired and ready for installation. All wiring is in strict accordance with National Electrical Code.

Motors—Standard make motors are used on all units, permitting the obtaining of replacements from local stocks without waiting for factory shipment.

Single phase motors 1½ hp. and larger are equipped with magnetic contactors in addition to vacuum controllers. Overload protection is provided wherever contactors are used.

Polyphase motors are equipped with thermal overload cutouts in sizes under 1½ hp. In larger sizes magnetic contactors with both overload and no voltage release are furnished in addition to the vacuum regulator.

Direct current motors of 1 hp. and under are compound wound, self-starting type. Above 1 hp. automatic starters are furnished in addition to vacuum regulators.

Vacuum Regulator—Vacuum regulator is set to cut in at 3 inches and out at 8 inches when unit leaves the factory, but may easily be adjusted to a higher or lower vacuum if desired.

Duplex Units—All sizes are available in both single and duplex units. Duplex unit consists of a single tank with two pumps, two motors and automatic starters.

Information Required with Order

1. Square feet of direct cast iron radiation or equivalent.
2. Electric current available—one, two or three phase, number of cycles and volts if alternating current; or voltage only if direct current.

STANDARD SIZES

Pump No.	Capacity, sq. ft. direct radiation	Air capacity, cu. ft. per min.	Motor hp.	Approx shipping weight, lb.
AL-1	4,000	1¾	¾	500
AL-2	8,000	4	1	600
AL-3	12,000	6	1½	750
AL-4	20,000	10	2	900
AL-5	30,000	15	3	1,000
AL-6	40,000	20	5	1,000
AL-7	60,000	30	5	1,200
AL-8	80,000	40	7½	1,400
AL-9	150,000	70	10	1,600

Continued on next page

Return Line Vacuum Systems

Equipped with

No. 7 Hoffman Adjustable Modulating Valves and Hoffman Traps or Return Line Valves

When installing Vacuum Pumps it is necessary to meet two requirements:

1. The distribution of steam should be uniform.
2. No steam should be present in the return main.

The No. 7 Hoffman Adjustable Modulating Valve meets the first requirement, in that it permits the Heating Contractor to externally adjust the port area of each valve to admit the proper amount of steam to the radiator. If branches to certain radiators are over-size, a port adjustment will aid in balancing up the steam distribution, or if pipes are not properly reamed an increase in port diameter counteracts the unbalancing of flow, due to the restricted pipe area. If it is required that certain radiators receive steam before others, this can be accomplished by port adjustment of the No. 7 Valve.

The Hoffman Traps or Return Line Valves comply with the second condition. No steam is permitted to pass into the return main, but air and condensate are freely discharged, thus enabling the radiator to give off its maximum amount of heat.

These two valves are, therefore, necessary to obtain best possible results in systems using Return Line Vacuum Pumps.

The foregoing pages illustrate and describe our products.

For further information regarding their application or typical details showing proper installation, write direct to HOFFMAN SPECIALTY COMPANY, INC., Waterbury, Conn.

We are specialists in the design and manufacture of devices for the handling of Steam, Air and Condensation, and welcome the opportunity to assist in solving such problems.

HOFFMAN SPECIALTY CO., INC.
Waterbury, Conn.
U. S. A.

Printed in U. S. A.